March 6, 1950

STEEL

The Magazine of Metalworking and Metalproducing

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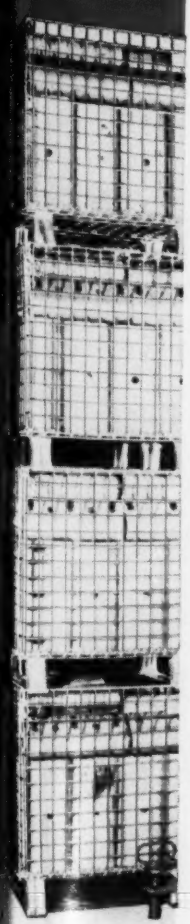

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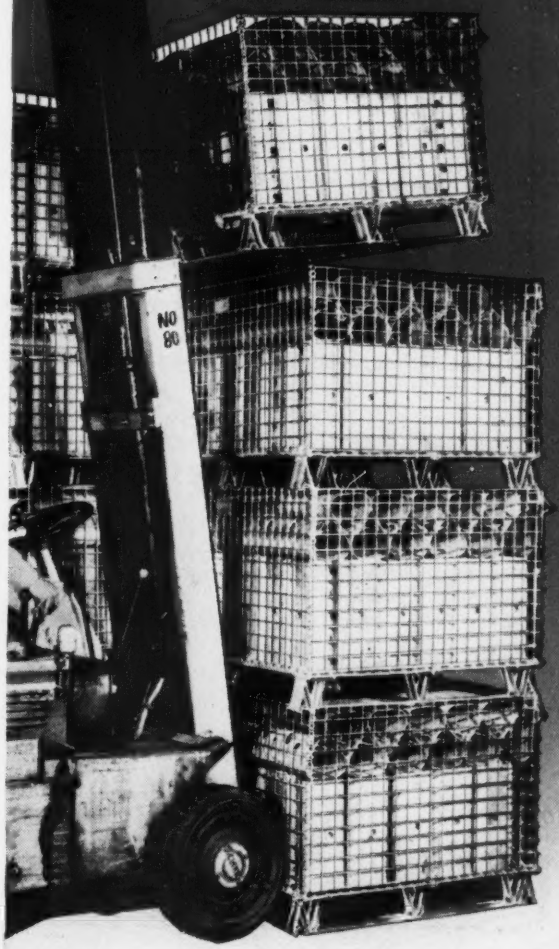

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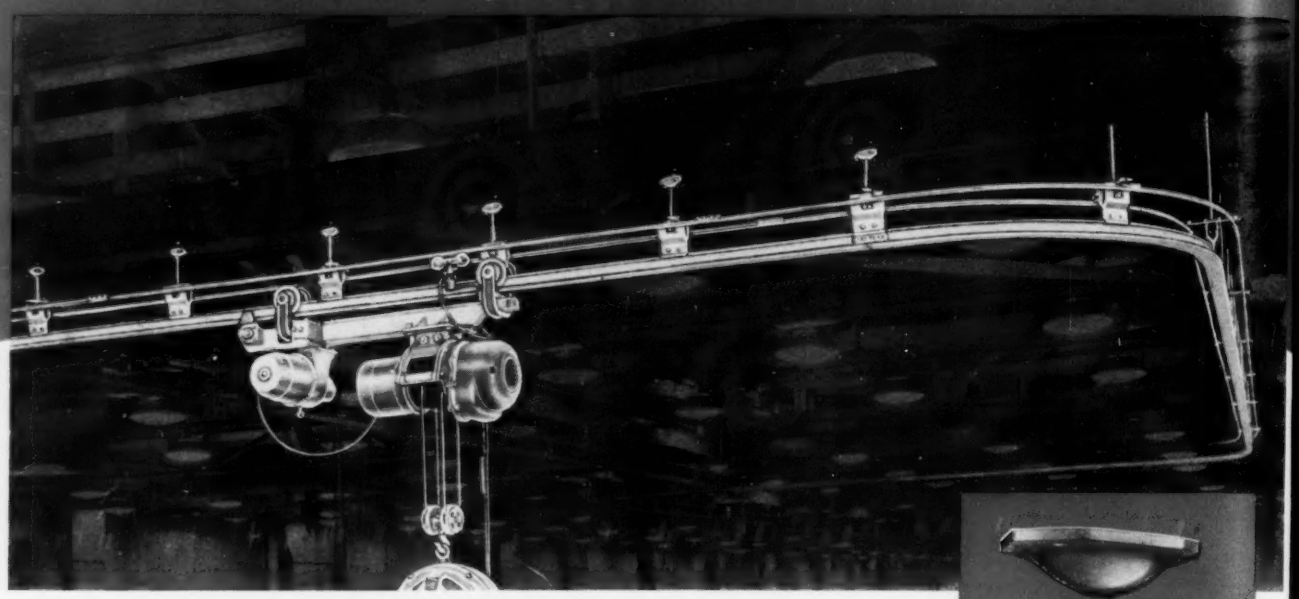

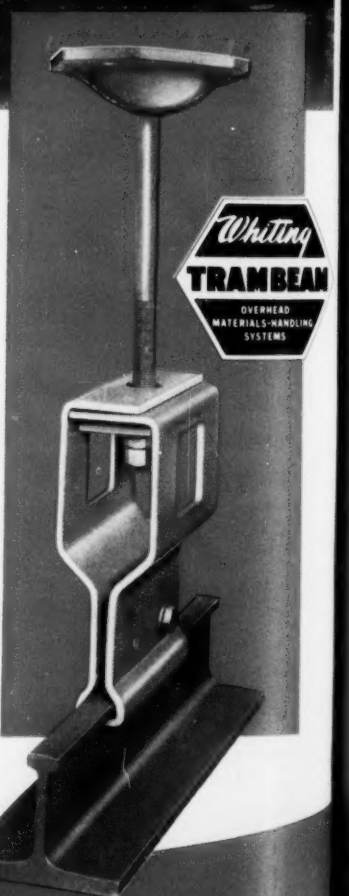

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Behind the Scenes . . .

New Neighbor

As you can see, we've shifted a little to make room, and we'll be here from now on. What promises to be an interesting and varied procession of neighbors will move in each week on our left.

The masthead for the business department that used to be on our right has been consolidated with the editorial masthead and henceforth will appear on the contents page—this week on page 43.

Another innovation—it started last week—is our new four-page business trend section that begins in this issue on page 68. In one package now you get a complete analysis of economic trends in metalworking.

Still another expanded department—it also started last week—is "Metalworking Briefs." It is a consolidation of the old "Briefs" and "Construction and Enterprise" sections. It is tailored to give you business tips, changes of address, new company alignments and other vital statistics for industry.

Double Your Money Back

Our advertisers, we're proud to say, can back up the claims they make in these pages. We've often wondered how some consumer goods advertisers react when challenged on their statements. We had a good chance to find out the other day when our fountain pen guaranteed forever wouldn't write. We sent it back to the pen company with an irate letter and just received this answer: "Dear Sir: This is a Wearwell pen, not ours. Sincerely yours, Parker Pen Co."

You Asked for It

We just received the word on the reprint situation for STEEL. And mighty good it is, too. You readers in 1949 ordered 78,225 reprints of 73 ads and 195,200 reprints of 72 articles.

Leaders among the aritcles reprinted include Walt Campbell's pension study published last April and the Fundamentals of Steelmaking series which is still running. If you want more copies of the pension study or the steelmaking series, write Readers' Service Department, STEEL, 1213 W. Third St., Cleveland 13, O.

In asking for reprints on the steelmaking stories, Walter A. Bates, president of Walter Bates Co. Inc., also sent in some additional information on wire. He reports that American Woven Wire Fence as manufactured by American Steel & Wire Co. and others was conceived in a dream by his father, A. J. Bates. Pere Bates made the first model at midnight with a couple of hairpins.

Another reprint favorite among the articles is our financial analysis of the steel industry, now compiled by Associate Editor Vance Bell. We have been publishing these summaries since 1929. The next one, for the year 1949, will probably be carried late in April.

The Contact Man

Walter Carroll of Republic Steel Corp. sends in this portrait of the outstanding contact man:

He must be a Republican and a Democrat, cherish the memory of Roosevelt and Pegler, tell stories in mixed company with finesse, discuss baby foibles with purchasing agents' wives, play poker five nights a week with the boys, smell like a man the next morning, chase blondes, sing psalms, buy drinks for his competitors, overeat, write 21 reports, drive 1000 miles a week, recognize his children, love his work, entertain a dyspeptic inspector for an evening at a cost not to exceed $3.75.

Puzzle Corner

F. F. Sheldrick of Budd Co. has convinced us that there is another logical answer to the trolley-and-sweeper problem of Feb. 13. Last week we said the sweeper walks 4 miles per hour and the trolleys travel 10 miles per hour. Another answer is: The sweeper walks 1.6 miles per hour and the trolleys go 4 miles per hour. Submitting this answer are Mr. Sheldrick; Thomas H. Messer of Gulf Oil Corp.; Arthur C. Thompson of Koppers Co. Inc.; and Herman Albertine of Adams Grease Gun Corp.

Here's a match puzzle, submitted by R. J. Spencer of Detroit Boring Bar Co.:

IV − III = VII

That is an incorrect equation. Move one match and make a correct equation.

Shrdlu

(Editorial Index—page 43)

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STEEL

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Next Week ... **Refractories—Types, Properties And Service Behavior—II ... Instantaneous Quality Control is New Method of Reducing Costs ... What You Should Know About Corrosion of Ferrous Metals ... Production of Forgings—I**

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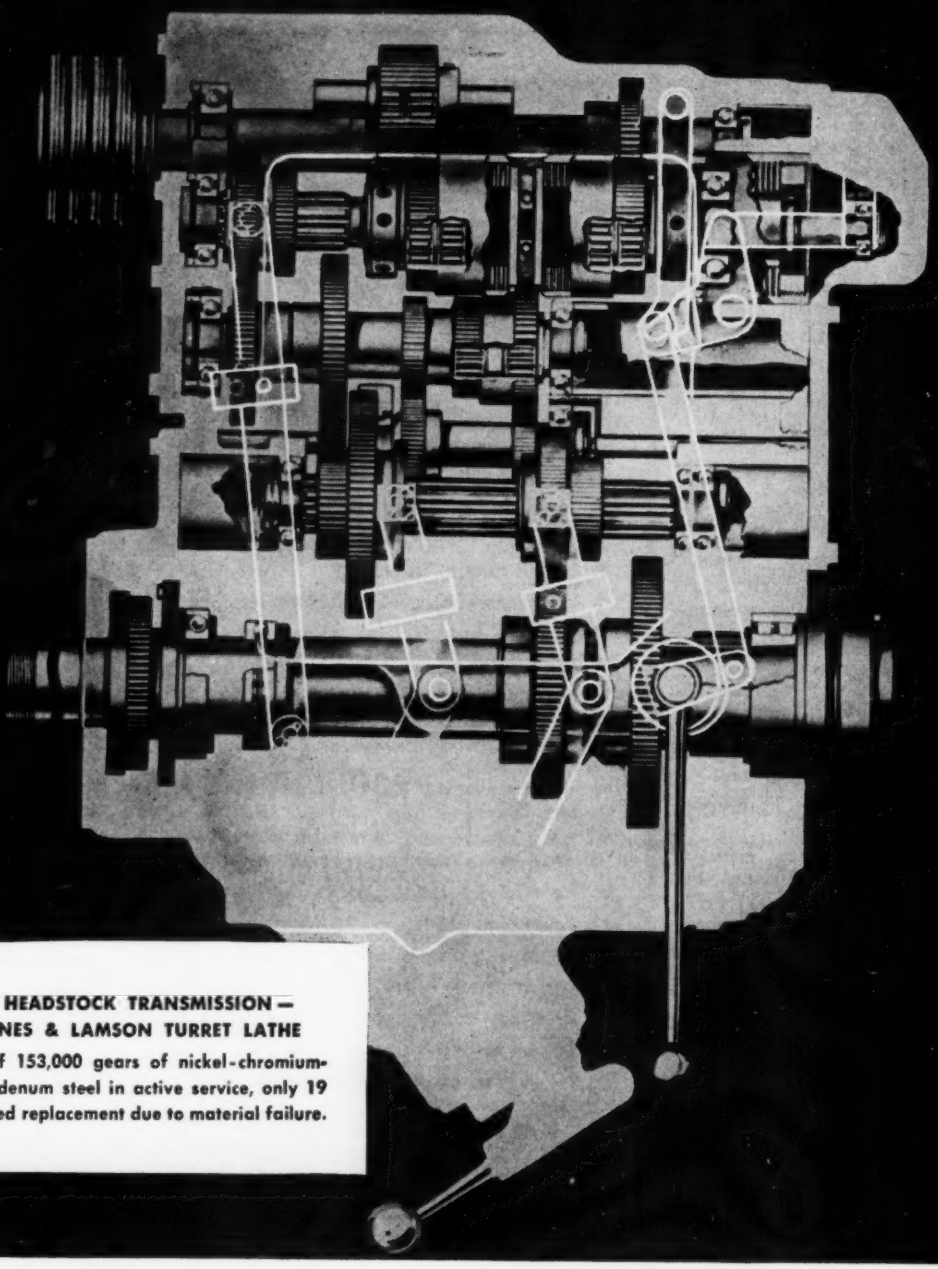

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Out of 153,000 gears of nickel-chromium-molybdenum steel in active service, only 19 required replacement due to material failure.

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THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

March 6, 1950

85 Per Cent Voted

First impact of the British Labor party's slim margin of victory was revealed last Thursday when Prime Minister Attlee informed his new cabinet that he has decided to hold in abeyance all plans for the further nationalization of British industries. At the same time it became apparent that the Labor government would welcome a graceful way of getting out from under its act to nationalize the steel industry, which was to have become effective Jan. 1, 1951.

The reduction of Labor's majority in Parliament from a commanding 146 seats in 1945 to a precarious seven seats in 1950 may not be as decisive as the recent overthrow of Labor governments in New Zealand and Australia or as the winning of majorities in the United States Congress by Republicans in 1946. Nevertheless it is a significant swing to the right which will have widespread repercussions.

Result of the British elections is similar in several respects to that of the 1948 presidential election in the United States. In both instances the incumbent government remained in office although it received a minority of votes. Mr. Truman's party received 49.3 per cent of the total vote, whereas the Labor party received only 46.2 per cent of the British vote. The Democratic party holds 60.2 per cent of seats in the House and 55.2 per cent in the Senate, whereas the Labor party has a bare majority of 50.6 per cent of seats in Parliament.

Mr. Attlee's government cannot remain in power long. Another election will become necessary soon. In the United States, Mr. Truman can remain in office until 1952, but he does not have enough support, even in his own party, to insure passage of much of the "welfare state" legislation to which he is committed. Thus we witness in the two largest English speaking nations governments which do not enjoy the confidence of a majority of their citizens.

Most important aspect of the British election was that 85 per cent of the eligibles voted, compared with 74 per cent in 1945. In 1948 only 52 per cent of eligibles in the United States took the trouble to vote. The object lesson is clear. If we want better government in America, we must induce more people to vote.

* * *

INDIVIDUAL DECISIONS: Everybody realizes that clever maneuvering by all parties concerned has plunged the coal mine situation into a terrible mess. It is understandable that at this late stage all principals are extremely cautious lest further mistakes be made.

One recent step in the long drawn out proceedings will be subject to discussion long after the strike is settled. It was the finding by Federal Judge Richmond B. Keech that the United Mine Workers is not guilty of civil or criminal contempt of court. The judge considered the government's charge that the union is responsible for the failure of 370,000 union miners to return to work as ordered by the court on Feb. 11.

Union attorneys had argued that the 370,000 miners acted individually and not as a result of union influence in their decision not to heed the court order. It is debatable, of course, as to what kind of evidence would be necessary to prove or disprove the truth of this statement;

(OVER)

AS THE EDITOR VIEWS THE NEWS

however, it would be interesting to know how a court would have regarded a similar statement had it applied to employers instead of miners.

For instance, imagine that 50 manufacturers —all of whom had quoted identical prices on a given product—plead in court through their attorneys that each one of the 50 had arrived at the same price individually and without being influenced by any organization.

It is doubtful whether any court would be impressed by such testimony. At least it would want more facts before reaching a decision.

—p. 51

* * *

ASK CONTROL OF FUNDS: In spite of all the furore over pension plans several months ago, much remains to be done before even the best of the pension agreements are fully implemented. Efforts to inaugurate pension plans in numerous smaller companies are being delayed because of confusion and misunderstanding.

Beyond this partial stalemate is a growing conviction that the enthusiasm for pensions among the rank and file of union members is not as great as had been indicated in recent months. There is mounting evidence that many workers are much more interested in improved life insurance, sickness and accident benefits and hospitalization.

This greater enthusiasm for these more tangible benefits is causing some union officials to demand a larger voice in the management of the funds required to support these benefits. This tendency already has resulted in a number of proposals which may lead to serious complications. The problem deserves careful study by all employers.

—p. 53

* * *

SAFETY REDUCES COSTS: Plant safety figures in the news in this issue from three angles. In 1945 Unit Drop Forge Division of Fuller Mfg. Co., Milwaukee, was disturbed by its high frequency rate of 50.7 lost-time accidents per million man-hours. It inaugurated a systematic safety drive, with special emphasis on good plant housekeeping. Within three years, the cost of medical and compensation payments were reduced from $7197 to $1570. Allowing for indirect costs, it was estimated total cost of plant accidents was reduced from $35,985 to $7850, an annual saving of $28,135.

Safety is big business for Ford Motor Co. It has 35 first aid stations and 28 hospitals, the largest staffed by 14 doctors. Our Machine Tool Editor comments upon the problem of designing safety devices which can cope successfully with the pernicious trait of some humans to make them ineffective.

Safety is a complicated problem, but success in solving it pays off handsomely.

—pp. 57, 66, 83

* * *

CASHES IN ON ACCIDENT: Alert observance of little things sometimes leads to important developments. Not long ago an engineer in the Headquarters Engineering Department of Westinghouse Electric Corp. was drilling a piece of Moldarta with a standard, high speed twist drill. The drill started to heat noticeably and then suddenly cooled. Sensing that something unusual had happened, the engineer examined the drill and found that the cutting edge of one flute had chipped near the center.

Acting on the hunch of this accident, the engineer single-notched and double-notched standard drills to simulate the condition of the chipped drill. Tests conducted with these notched drills showed that they performed better than perfect standard drills. Also, notched drills were found to be capable of drilling more holes before breakdown than standard drills. There are some precautions to be taken with notched drills, but in the main they offer advantages well worth investigation.

—p. 56

* * *

MORE TRUCKS SCRAPPED: Latest figures compiled by R. L. Polk & Co. on the scrapping of passenger automobiles and trucks throw interesting light upon the replacement market for motor vehicles. In 1949, owners failed to register 1,220,041 passenger cars and it is assumed they were scrapped. This is appreciably lower than the 25-year average scrappage of 1,601,940 units annually. Also it represents only 3.45 per cent of the cars in use.

The experience in trucks is just the opposite. In 1949 a total of 384,038 trucks disappeared from registration and were assumed to have been scrapped. This is far ahead of the 25-year average truck scrappage of 258,980. The 1949 scrappage represented only 6.4 per cent of trucks in operation.

Polk figures mean that motordom's replacement market is about 1.5 million passenger cars and 500,000 trucks a year.

—p. 65

E. L. Shaner

EDITOR-IN-CHIEF

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News Summary

COAL—The tangle in the national economy resulting from the coal strike will reach tragic proportions this week if normal coal mining operations aren't resumed in the next few days (p. 51). Despite the antics in coal, February was a good month in metalworking activity. The same won't be true for March. There will be a lag—chances are it will be fairly short—between the time miners return and, say, an auto parts supplier can get his steel supplies back in balance. The steel industry produced at around 70 per cent of capacity last week, but the rate today has already slipped to about 60 per cent. . .Americans reportedly are dickering with West Germans for 12,000 to 15,000 tons of rolling mill products worth $1.2 million. That tonnage would bolster dwindling steel stocks in the U. S.

LONG-TERM BUSINESS OUTLOOK—Don't bet on widespread price reductions similar to General Motors Corp.'s cuts (p. 70). Prospects are that the price level for the year will be about the same as it was in 1949. . . Associated General Contractors of America predicts that volume of all construction in the U. S. may reach the alltime peak of $30 billion in 1950 (p. 55). . . The promising boomlet in freight car buying which started last November may be losing steam because of curtailed rail operations resulting from the coal strike.

AUTOMOBILES—Coal and Chrysler Corp. strikes threaten to throttle automobile production (p. 65). After six weeks of negotiations, Chrysler management and labor still can't get together. General Motors Corp., Ford Motor Co. and the independents have been going full tilt, but no longer. Cutbacks in Detroit are mounting.

PENSIONS AND INSURANCE—Unions are having pension and insurance troubles and as a result may be shifting tactics (p. 53). They have their programs in the steel industry, at Ford and other large companies but they have been unsuccessful in getting the plan accepted by most smaller companies. What's more, there are legal disagreements over some of the programs already set up. One tactical shift is being tried out in Toledo where the UAW is trying to bull through a program on an area basis. A variation of this is being tried in Detroit. There, the UAW is trying to push through a group insurance policy that would cover employees in many companies. Under this plan, annual dividends on premium rebates would revert to the union and might be used as political funds in perpetuating and extending union power, even barring non-union employees from participating in the policy.

COST-CUTTING—Look for announcement of big cost-cutting programs in metalworking over the coming year. Westinghouse Electric Corp. is embarking on a four-year plan to reduce costs in every division. . .Through a lucky accident Westinghouse discovered that a notched drill cuts faster and drills last longer (p. 56). . .A revolutionary new method of hot rolling steel may result in lower cost of equipment and in producing steel strip (p. 56). A single-stand Sendzimir hot mill now being tested can reduce ¾-inch material to 0.03-inch in one pass. . .Safety is paying off as a cost-saver for United Drop Forge Division of Fuller Mfg. Co., Milwaukee (p. 57).

BASING POINT—The Federal Trade Commission is still undecided about how to clear up its case against the steel industry on delivered pricing (p. 58). Relief may come from Congressional action. The O'Mahoney freight absorption bill is back in House-Senate conference where wording will be worked out that is acceptable to the administration.

BRITISH NATIONALIZATION—The narrow margin of power that Labor holds in the British parliament means that an act passed last fall for public ownership of steel will not be implemented and other socialization proposals in cement, sugar and other industries won't be acted upon immediately (p. 62). Another election is inevitable within a few months. Labor is committed to nationalization. Will the party be able to boost its majority?

Production Engineering News—p. 79 Market Summary—p. 141

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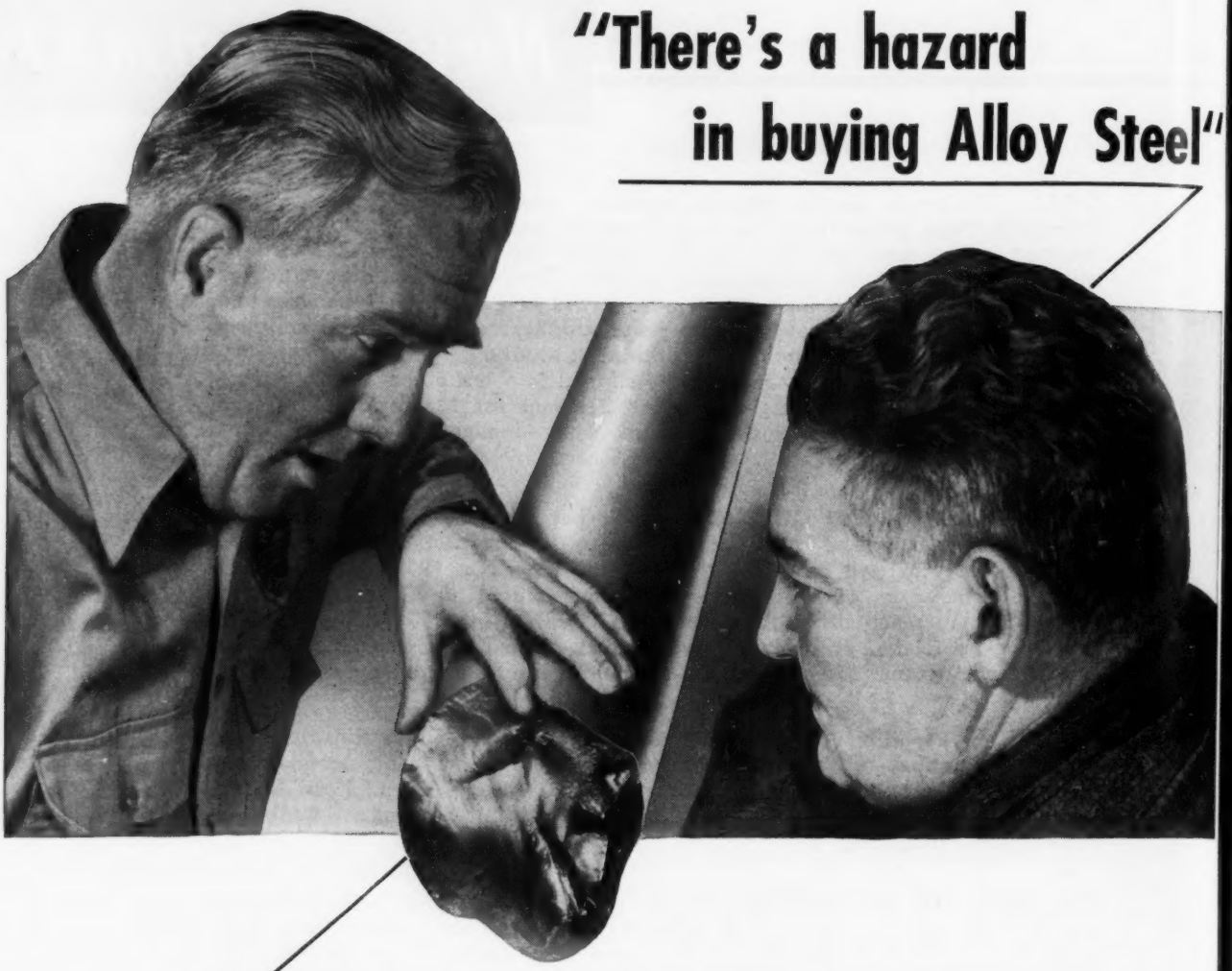

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Industrial Decline Accelerates

Metalworking plants shorten work-week as gas, power and steel supplies fail due to coal shortage. Ingot operations toboggan. Sharper reductions scheduled

AUTO traffic was snarled in one industrial city because the municipal power plant didn't have enough coal to generate electricity for the signals. The snarl in economic traffic grew worse last week; it will be in a terrific tangle this week if normal mining operations aren't resumed in the next few days.

Despite Treasury Secretary John W. Snyder's belief that a "tremendous" volume of business is in sight if the coal strike is settled, metalworking's March performance can be no match for the good February level. One encouraging sign: Past history supports the belief that metalworking recovery can be fairly rapid once normal mining operations are resumed.

Decline To Accelerate—Today the steel industry is operating at about 60 per cent of capacity; the decline will accelerate this week if the miners still stay home. Last week's average ingot operating rate slipped to 70 per cent. Consumers are having the worst time getting shapes, plates, bars, besides the perennial problem products, sheets and pipe. Virtually every steel company in America has already had to cut back somewhere —blast furnace, coke oven or open-hearth operations—and more curtailments are in store. Industrial cutbacks are even coming more rapidly with companies having comfortable coal stocks. Many are sharing their supplies with municipalities, public institutions and hard-pressed domestic users.

Unbalanced stocks probably will stifle operations more quickly than cuts in total steel production would indicate. Hardest hit by the steel shortage are appliance makers and parts suppliers for the automotive industry. A three or four-day week is now common in these and other industries. Some manufacturers are turning to substitute materials, particularly aluminum.

Eighty new coke ovens are processing 1850 tons of coal daily for Republic Steel Corp. at Warren, O.—as long as the coal supply lasts

Other Shortages—Other shortages —notably in power and gas—are curtailing metalworking production nearly as much as the steel scarcity. The 25 per cent cut in power use, ordered by Illinois Commerce Commission to conserve power companies' dwindling coal supplies, is hitting Chicago area companies. International Harvester Co. cut operations at eight of its nine plants in Illinois to a three-day week from a five-day week. Many Chicago area steel producers are saving power by stopping electric furnace operations. Power cutbacks are still curtailing metalworking production in Pittsburgh.

The weather and Mr. Lewis have worked a double play on gas supplies in several industrial areas. Low temperatures last week forced Peoples Natural Gas Co., Pittsburgh, to cut the supply of natural gas to industrial customers to mere equipment maintenance levels. The company has 150 industrial customers in western Pennsylvania. East Ohio Gas Co., Cleveland, also had to cut the use of industrial fuel gas by 50 per cent last week because of cold weather. It services users in northeastern Ohio.

Black Gold

QUESTION: When's a lump of coal as precious as silver? Answer: When John L. Lewis closes the bituminous mines.

Last summer when Timken Roller Bearing Co. was celebrating its 50th anniversary, it had on display at an open house a case filled with silver dollars to illustrate that "taxes are pretty high." It has changed the silver for another valued substance, coal, with the explanation that "coal is pretty high" and will go higher if Mr. Lewis can make a deal with the government.

Coal for Civilians

BARRELS and boxes at the entrances to industrial plants in Pittsburgh carry placards begging for "Food for Miners." Industrial workers and the public are unresponsive. The containers are empty.

"What's the matter? No charity?" an out-of-town visitor asked a Pittsburgh industrial executive.

"Humph," he snorted, "it would be more to the point if the placards read: 'Coal for Civilians.' "

Miners Innocent of Contempt

Federal Judge Richmond Keech upset the government's first attempt to persuade the miners to return to work through contempt proceedings. The judge held the United Mine Workers are not guilty of either civil or criminal contempt. His reason: Lack of sufficient evidence.

Coal Stoker Sales Slide

Stoker manufacturers' sales are dropping, and they put the blame on John L. Lewis.

The great upheaval in the economic positions and general relationships between the various fuels used for heating, commercial and industrial purposes is attributable to the monopolistic powers wielded by Mr. Lewis' mine workers, says Claude A. Potts, president of Stoker Manufacturers' Association and vice president of U.S. Machine Corp., Lebanon, Ind. Coal is losing its position as the number one

COAL WOULD COMPLETE THE PICTURE: This new hopper type truck body, which can haul about 26 tons of coal, was designed by Marion Metal Products Co., Marion, O. Four of them were delivered to West Virginia Coal & Transportation Co. The hopper body has a capacity of 35 cubic yards. Inside dimensions are 90 inches x 26 feet. Air-operated hopper doors are 8 feet long and 3 feet wide; they are actuated by controls inside the cab

fuel because of drastically increasing prices and the uncertainty of supplies.

SMA votes unanimously to support S. 2912, the bill proposed by Sen. A. Willis Robertson (Dem., Va.) which he introduced in January "to protect trade and commerce against unreasonable restraints by labor organizations."

Roads May Cut Steel Rates

Eastern railroads are proposing substantial reductions in rail rates on certain iron and steel products to meet truck competition, says John J. Fitzpatrick, chairman of the Traffic Executive Association-Eastern Railroads.

The association will meet Mar. 9 in Pittsburgh where views of interested parties will be obtained before the new tariffs are drawn up for submission to the Interstate Commerce Commission. Specific items and exact rates will be determined at the meeting. They would become effective only after ICC approval. The area affected is east of the Mississippi and north of the Ohio and Potomac rivers.

A similar move to cut rates on steel shipments was instituted by Chicago, Rock Island & Pacific Railroad last fall to meet truck competition.

Rail Tax Repeal Urged

Outright repeal by Congress of wartime excise taxes on railroad freight shipments and passenger fares is urged by American Railway Car Institute which represents makers of freight and passenger cars in the the United States.

The taxes, which amount to 15 per cent on passenger fare and 3 per cent on freight, were levied to restrict unessential passenger and freight movement during the war.

Locomotive Outlook Good, But

American Locomotive Co.'s outlook for the year is good, "but not as good as at the same time last year," says D. W. Fraser, chairman.

The backlog of orders is down from $105 million at the time of the 1948 annual report to about $50 million now. The backlog should mean a good level of production during the first six months of the year, but prospects for the second half are uncertain.

Watch the Birth Rate

SALESMEN should gather information at the grass roots and forecast customer requirements far ahead. This is the advice given American Steel & Wire Co. salesmen at a Cleveland district meeting last week by Harry M. Francis, vice president —sales.

Forecasting by salesmen is of prime importance in the steel industry where production rate changes have so large an impact on costs, says John Graham, general manager of sales. Through accurate forecasting the salesmen join the engineers in the plant in keeping costs under control.

Harvey G. Jordan, president, has a graphic explanation of how the salesman should keep informed on customer needs. If the customer makes baby buggies, the steel salesman should acquaint himself with baby buggy style trends, watch the birth rate and even determine the inclination of the current generation toward size of family.

Pipe Mill on Schedule

USERS of large diameter pipe will find heartening the news that A. O. Smith Corp. of Texas is up to schedule on constructoin of its Houston mill. Fifty per cent of the work has now been completed.

Operations will begin Aug. 1 if nothing impedes progress. This betters by several months the company's original construction schedule.

All structural steel is erected for the main pipe mill building, a structure 200 x 675 feet, and the pickle building, 81 x 202 feet. The south bay of the main building is completely roofed and concrete foundations for the office building were poured.

The mill will initially produce 30-inch diameter resistance welded pipe, but its equipment will accommodate diameters as large as 36 inches. Monthly capacity will be 30,000-35,000 tons.

Lippert to Titanium Metals

THOMAS W. LIPPERT is new manager of Titanium Metals Corp. of America, 60 East 42nd St., New York, recently organized by National Lead Co. and Allegheny Ludlum Steel Corp. to market titanium. Lippert formerly was director of publications for the American Institute of Mining & Metallurgical Engineers and until June, 1949, was directing editor of the *Iron Age*.

Quality Control Group Meets

AMERICAN Society for Quality Control's national convention and midwest conference, to be held in Milwaukee June 1-2, will be dedicated to "greater quantity, better quality, lower costs."

Exhibits will be on display at the Milwaukee Auditorium. Co-operating groups are the Milwaukee Association of Commerce, the Wisconsin Manufacturers Association, University of Wisconsin and Marquette University. Educational sessions designed to acquaint personnel with principles of quality control will be directed by Dr. E. G. Olds, Carnegie Institute of Technology.

For reservations and other information write Fourth National Convention, Fifth Midwest Conference, P. O. Box 1204, Milwaukee.

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Union Welfare Drive Bogs Down

Smaller companies are unwilling to accept pattern settlements . . . Auto workers start drive for union-administered insurance programs to provide "slush" funds

THE CURRENT RUCKUS over union pension and insurance demands that are being wrangled out by most of United States industry makes one thing clear: General settlements in the great majority of cases are still far distant. Efforts by CIO steelworkers and auto workers to ram through "pattern" agreements in large plants and then win acceptance of similar plans on down the line have failed miserably. Even the major contracts embodying pension plans remain to be fully implemented, let alone understood.

In the auto industry, the issue is bogged down seriously at Chrysler Corp. where major union demands are calling for at least the equivalent of an 8¾ cent "cash in the drawer" payment claimed to have been granted by Ford. Yet there are grave questions over interpretation of the Ford pension proposal that went into effect Mar. 1, with first payments to be made Apr. 10. The UAW insists on a flat sum being paid into a pension fund for every hourly-rated employee, the company contends the 8¾ cent figure is an arbitrary one to be tempered in the light of actuarial demands of the moment.

Chrysler Dispute Deadlocked—It is difficult to see how any break can come in the Chrysler negotiations as long as the Ford plan remains unfrozen, particularly since Chrysler has offered its 89,000 employees benefits equal to or somewhat better than Ford.

The international unions big headache right now is selling their membership on the logic of tremendous economic sacrifices ($30 million already at Chrysler) for something as intangible or far-distant as $100 per month pensions.

No Local Enthusiasm—Actually, in union locals there has been no great rallying for pensions. They have been more enthusiastic over improved life insurance, sickness and accident benefits, hospitalization, etc. In recent months there have been several secret agreements signed with smaller companies—not many, but at least a handful—providing an "insurance" package and possibly some wage-inequity adjustments, totaling 6-8 cents an hour. And in some instances these contracts have been "buttoned up" for two years or more.

Want Control of Funds—There are grounds for belief union strategists are coming to the viewpoint that either pensions or insurance plans can be developed which would give them a measure of control over large funds, and if the membership does not go for pensions then it may be possible to sell insurance packages which would still produce the funds.

An interesting case in point is that of a Detroit metalworking company employing about 250. Last fall it concluded an agreement with the UAW-CIO covering added insurance benefits totaling several cents an hour. A committee of four trustees was set up, two from the union and two from management, to supervise details of purchasing the insurance. At first the UAW wanted one of these trustees to be a representative of the international staff. The management insisted both labor trustees be employees of the company and won its point.

Next the argument turned to where to buy the insurance. The company has held group policies with one carrier for over 20 years and, by virture of the "experience factor", would have enjoyed a more favorable premium rate than from another company. However, the UAW proposed to include the company's employees as one group in a master policy to be placed with a West Coast carrier.

Union Would Get Dividends—Under the latter arrangement, annual dividends or premium rebates which often amount to 25 per cent or better would revert to the union and then be apportioned to the various participating locals.

The West Coast underwriters suggested a two-year policy which on the basis of premiums running from a minimum of $100,000 annually up to $5 million, would permit it to retain up to 7 per cent for administration, etc. As of this writing there was question over whether Michigan state approval of this master policy could be obtained. Such a policy might cover 500,000 or more employees in a wide group of plants.

Might Be Political Fund—Although ostensibly premium rebates on the policy either would be returned to the individual companies, or used for "emergency and hardship" cases, actually they would be remitted to the union and conceivably might be diverted to political or slush funds to be used for perpetuating and extending union power and influence, even to the point of barring non-union employees from participation in the policy. In many ways, the union insurance scheme is tantamount to the "Toledo Plan" area pension proposal.

As yet there has been no final decision at the Detroit firm on the extended insurance coverage. If the trustees remain deadlocked, then there is provision for appointment of an impartial arbitrator who can decide the issue. Meanwhile the com-

GLAD HANDS: Irving S. Olds, board chairman of U. S. Steel Corp., shakes hands with sister shareholders at a special meeting of stockholders held in Hoboken, N. J. Pension and insurance benefits for U. S. Steel employees were voted at the meeting

pany thinks it may increase its present group policy to the extent proposed, with the provision for a 30-day cancellation notice if other arrangements are to be made.

Steel Stock Ownership Scattered

OWNERSHIP of iron and steel company stocks has become more widely scattered among the public since World War II, according to an American Iron & Steel Institute survey of 52 companies representing 91 per cent of total steel capacity.

Individuals held 64 per cent of the total number of the shares outstanding in the latter part of 1949. A similar survey in 1946 indicated that individuals held 60 per cent of total shares in 56 companies representing 91 per cent of the total output of steel ingots at that time. Ownership by institutions, including many types of business firms, declined to 30 per cent from 34 per cent of these steel stocks in 1946.

To Produce Ductile Iron

WESTINGHOUSE Electric Corp. is completing licensing arrangements with International Nickel Co. for production of ductile cast iron at its Trafford, Pa. foundry. Some castings will be switched over from gray iron to ductile iron.

Pig Iron Output Slips

PIG IRON, ferromanganese and spiegeleisen production in January totaled 5,293,596 net tons, American Iron & Steel Institute reports. Output in December was 5,230,715 tons; 5,725,000 tons in January, 1949.

January, 1950, pig iron output was 5,232,764 net tons; ferromanganese and spiegeleisen, 60,832 net tons. Production in that month represented 87.1 per cent of capacity—figured at 71,497,540 tons annually.

Hare-ied

DON'T BE SURPRISED if the boys in the pipe division office of Republic Steel Corp., Cleveland, take up the practice of magic. They now have part of the necessary equipment.

One of their customers, U. S. Supply Co., a Kansas City, Mo., jobber, pleaded for delivery of some pipe.

The Republic office, which often wished that by some magical means it could fill the demand for pipe, explained by letter why immediate delivery was impossible and good-humoredly suggested that "if you have any rabbits, you might send us some so we can pull a few out of a hat."

A few days later the Republic office received a box from U. S. Supply. In it: A white rabbit.

Tight Economy Projected If War Comes

WHAT KIND of an economy can we expect if there's a war emergency?

A very tight one with much more drastic government controls than in World War II, according to a memorandum adopted by the National Security Resources Board and just released from its original "confidential" classification.

Not a blueprint, the memorandum is rather a summation of possible controls in case of war. NSRB spokesmen point out that the measures considered would be approved or rejected on the basis of military needs for materials and manpower—and there are no estimates of such needs right now.

None of the controls discussed in the memorandum would become effective without congressional authorization.

Because there might be a vast buying wave in the early days of another war, the main controls suggested by the board are aimed at checking inflationary consequences.

These are the main controls that NSRB thinks require immediate consideration on M-Day:

1. Immediate freezing of prices, wages and rents, followed by designation of authority to make equitable adjustments.

2. Introduction of a rationing system and freezing of stocks of hoardable goods in wholesale and retail establishments.

3. Stoppage of auto production and all other consumer durables and of many non-durables; stoppage of all private building construction.

4. Ban on installment buying and a curb on bank credits.

5. Adoption of a draft-labor law, giving government authority to move workers where needed.

6. Imposition of higher corporate taxes and re-imposition of excess-profits tax; increase in capital-gains tax; increase in personal income taxes to about three and a half times the rates during World War II (in 1944 about 10 per cent of personal incomes was collected as federal income taxes) to drain off excess consumer purchasing power.

7. Adoption of forced-savings and expenditure-limitation plans to drain off purchasing power left after taxes.

Bethlehem Capacity Up

Expansion expenditures total $318 million since war; $100 million more projected

BETHLEHEM Steel Co. increased its ingot capacity by 800,000 tons in 1949 and now has a total capacity of 15 million tons.

E. G. Grace, chairman, says the new rating is "partly as the result of construction of an electric furnace at Los Angeles and rebuilding of open-hearth furnaces at other plants and partly to reflect actual capacities of existing furnaces demonstrated for the first time in 1949."

To Spend $100 Million More—Bethlehem has spent $318 million since the war on modernization and expansion and will spend $100 million more. New projects, authorized and underway, include added sheet and strip capacity and other facilities at Sparrows Point, Md., and Lackawanna, N. Y. Also included are: Improvements to the open-hearth department, electrification of the 18-inch mill and rebuilding of a battery of coke ovens at Johnstown, Pa.; a new 75-ton electric furnace and added finishing facilities at Los Angeles; a new fabricating works at Seattle; additional machinery and equipment at Lebanon, Pa., South San Francisco, Calif., and in the coal mines; improved equipment at Sparrows Point, Baltimore and Beaumont, Tex. shipyards.

Jobs completed in 1949 include: Modernizing of foundries at Bethlehem, Pa.; improvements to the water supply system at Sparrows; two large steam generators and additional facilities for cold-formed products at Lackawanna; additional facilities at the No. 2 open hearth at Lackawanna; a new ore bridge and turbo-generator at Steelton, Pa.; additional sintering capacity at Johnstown; new coilers for the 10-inch bar mill at Lebanon; a new welding and fabricating shop at Tulsa, Okla.; improved facilities at Quincy, Mass., Staten Island, N. Y., and Beaumont shipyards; additional mechanization and washing facilities at the coal mines.

Ore Program Nearly Finished—Development of iron ore properties in Venezuela is nearly completed. Work is progressing both at the mine and at the ocean harbor.

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Construction Peak Seen

Associated General Contractors foresee $30 billion volume in 1950 in new and repair work

VOLUME of all construction in the U. S.—both new and modernization work—may reach the alltime peak of $30 billion in 1950, says Associated General Contractors of America Inc. The report, made from a survey among AGC's local affiliated organizations, was issued at the annual convention of AGC in San Francisco.

Of the $30 billion total, some $20 billion will represent new construction and $10 billion maintenance and repair operations.

Keen Competition Seen—The 5500 contracting firms contributing to the survey believe 1950 will see the keenest competition among builders in the last 15 years. This trend began in 1949 and is becoming steadily more apparent.

The report cites instances where more than 30 bidders are competing on one contract.

One effect of this development will be to hold costs steady. The cost of heavy construction generally is indicated for 1950 at around 10 per cent below the peak of 1948. Heavy engineering projects, such as railroads, bridges, dams and waterworks, are reported stabilized, costwise, at 10 per cent under the peak. Highway costs, including airports, are down nearly 13 per cent and are still declining slightly. The cost of large industrial, commercial and residential buildings has dropped less, being estimated at 8.5 per cent under the 1948 high.

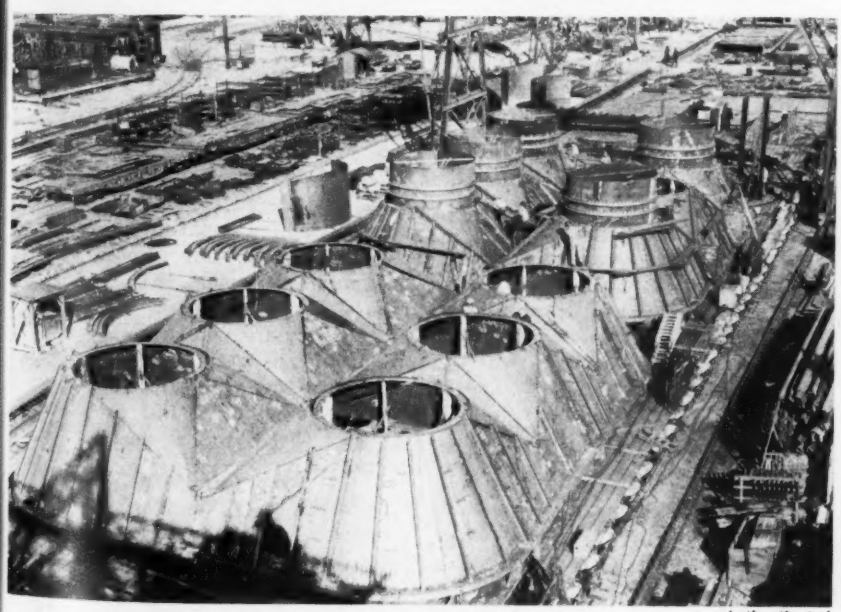
Productivity Better—Although no reductions have been seen in labor costs, this factor has been offset partially, contractors report, by increased productivity by workers. An adequate labor supply is foreseen by most builders during the coming year.

Any spotty shortages which may occur will come during the summer months.

Nearly all contractors believe they will have adequate supplies of materials in 1950. This is contingent on the length of the coal strike. Shortages of fuel, it is believed, could bring some stringency in steel and cement supplies next summer.

Too Much Public Works?—Some builders are seriously worried over concentration of heavy construction in public works. Any cessation of governmental projects, it is held, would place the contracting industry in a precarious position because of a dearth of private work.

The concentration of contracts into large public projects also is a factor in stimulating the heavy competition between builders. Although this competition is seen as "healthy" in stabilizing costs, it also means paring of profit margins for the contractors themselves, the report indicates.



Authenticated

STALWART SUPPORT: Two of the six huge steel caissons that will be used as permanent forms to support the George P. Coleman Memorial bridge across the York river at Yorktown, Va., are shown under construction. The bases of two of the steel caissons, 52 x 66 feet, are in the foreground. When completed, the steel shells will be 110 feet high and will support concrete cylindrical piers 90 feet high. The bridge—the most costly ever undertaken in Virginia—is scheduled for completion in 1952

Columbia Pulls Out

Withdrawal from Buffalo, like that from Milwaukee, is result of high freight costs

E. L. PARKER, president of Columbia Steel & Shafting Co. and its associated companies, Edgar T. Ward Sons Co. Division and Summerhill Tubing Co. Division, announces the sale of Edgar T. Ward Sons Co. warehouse in Buffalo to Service Steel Co., Detroit.

Columbia sold the Milwaukee warehouse of Ward to Central Steel & Wire Co., Chicago, several weeks ago (STEEL, Feb. 6, p.59).

Ward's withdrawal from the Buffalo market is a continuation of the policy of disposal of properties in unfavorable freight areas, Mr. Parker says. (The Milwaukee warehouse was sold for the same reason.) Buffalo is a producing point of cold-finished steel bars, and a shipment of bars manufactured in Pittsburgh for distribution represents the full absorption of all freight between the two points.

Service Steel Co. has had a warehouse in operation in Buffalo for many years. It distributes steel tubing and cold-finished steel bars. Service will integrate the Ward business with its present operations. It also manufactures cold-drawn seamless and welded tubing. It has warehouses in Detroit, Buffalo, Cincinnati, Chicago and Los Angeles.

Crucible Moves Tool Steel Center

TOOL STEEL sales headquarters of Crucible Steel Co. of America, New York, are now installed in the Sanderson-Halcomb Works in Syracuse, N. Y., says H. M. Giverns Jr., general manager of tool and high speed steel sales.

The move from New York city to Syracuse combines and centralizes the Crucible Tool Steel Sales Division with the Production, Research and Development departments in the enlarged and modernized plant.

The location of tool steel sales in Syracuse is the latest step in a three-year program of modernization and expansion by Crucible in Syracuse. The Sanderson-Halcomb Works represents the integration of specialty steel facilities formerly operated in three smaller plants. The program has cost some $3.6 million since 1946.

A new master warehouse at the Syracuse plant, covering an area of 70,000 sq ft, provides fast delivery service and complete distribution of the thousands of tool steel items produced in Syracuse. The new warehouse is also stocked with products

of other Crucible mills; it is one of three new mill pool warehouses installed at principal plants. R. A. Schneid is manager of Sanderson-Halcomb Works. T. W. Corcoran supervises the Syracuse warehouse.

Majestic Sold to Hussey

C. G. HUSSEY & CO., Pittsburgh, bought the business and facilities of Majestic Finishing Co., Baltimore.

Hussey will manufacture Majestic copper flashing and market it through Hussey warehouse facilities. J. P. Lally, president of Hussey, says production equipment is now being moved from the Baltimore plant, and the product will be produced in Pittsburgh as soon as the changeover can be accomplished.

Hussey, a division of Copper Range Co., is a prime producer of flat-rolled copper; it has rolling mills in Pittsburgh and fabricates a complete line of copper roof drainage and building products.

Majestic flashing was formerly produced from Hussey copper, says Mr. Lally, and the same product will continue to be marketed. Sales will be continued through the sheet metal and roofing distributors—made possible through seven Hussey warehouses in New York, Philadelphia, Pittsburgh, Cleveland, Chicago, Cincinnati and St. Louis.

Laclede-Christy To Buy

LACLEDE-CHRISTY Co., St. Louis, entered into an agreement to acquire the assets and liabilities of Chicago Retort & Fire Brick Co., Ottawa, Ill., in exchange for common stock.

Chicago Retort & Fire Brick was organized in 1887. Since then it has been continuously engaged in manufacture and sale of fire brick and high temperature cements. Its large plant at Ottawa was recently modernized.

New Hot Rolling Technique

A REVOLUTIONARY new method for hot rolling steel may result in lower cost of equipment and in producing steel strip. A single stand Sendzimir hot mill now being tested can reduce ¾-inch material to 0.03-inch in one pass.

Reduction is effected by numerous 1½-inch diameter rolls positioned parallel to and around the face of a pair of 8-inch diameter rolls. The work is fed into the mill by a set of pinch rolls and while in the pass it is in contact with two or more of the small idler-type rolls. Material now being produced is about 6 inches wide.

Adds 20-Foot Roll

INSTALLATION of a new 20-foot roll to the equipment of the Houston Works vessel shop of A. O. Smith Corp., Milwaukee, more than doubles its capacity for rolled plate work. Capable of handling material up to ¾-inch thick, the roll permits fabrication of longer vessels with fewer welds. In addition to vessel work the equipment will be used for fabrication of short runs of large diameter pipe.

Lady Luck Shows Way to New Drill Grinding Method

ACCIDENTAL discoveries often play an important role in finding ways to do things better, cheaper and faster.

Such a lucky accident was the chipping of a drill at the Headquarters Manufacturing Engineering Department, Westinghouse Electric Corp., Pittsburgh. While drilling a piece of Moldarta with a standard, high speed twist drill, the drill which had started to heat suddenly began to run cool. Examination showed R. Double, Westinghouse engineer, the cutting edge of one flute had chipped near the center. The resulting grooved condition in the lip of the drill had apparently caused the improved performance.

Developed New Drills — Subsequent development work by Mr. Double under the direction of J. B. Dym, section engineer, led to the development of single and double-notched drills shown in the diagram at the bottom of the page.

The single-notch has one notch centrally ground into the cutting edge of one flute. The double-notch grind consists of two notches, one in each cutting edge.

With the double-notch grind the two notches are so spaced that each cutting edge removes the portion of the material left uncut by the other.

Cuts Faster — Tests on 1-inch thick, hot-rolled steel plate showed that notched drills performed better than standard drills operated at recommended feeds and speeds:

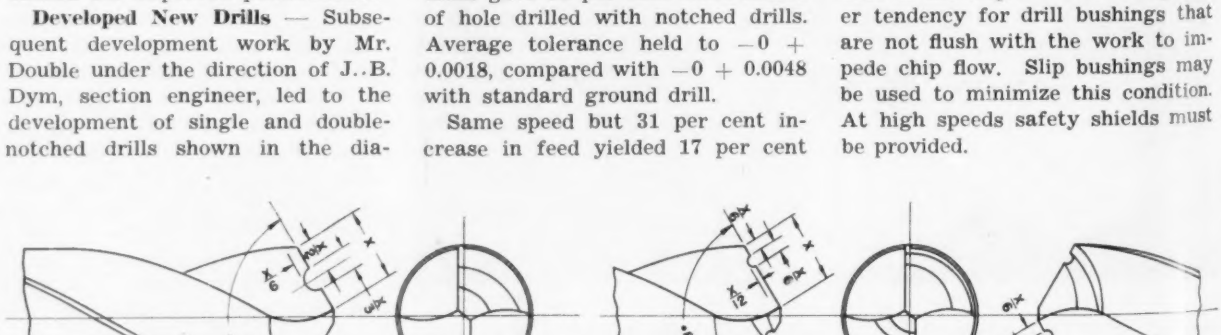
Same feed and speed on standard ground and double-notch ground drills gave 55 per cent more inches of hole drilled with notched drills. Average tolerance held to −0 + 0.0018, compared with −0 + 0.0048 with standard ground drill.

Same speed but 31 per cent increase in feed yielded 17 per cent more inches drilled with double-notch grind. Average tolerance held, −0 + 0.0018.

Feed increased 69 per cent and speed decreased 10 per cent, gave 14 per cent more inches drilled with single-notch ground drills. Average tolerance held, −0 + 0.0088.

Drills Last Longer—Other tests conducted by Westinghouse show notched drills capable of drilling more holes in a given material before breakdown.

There are some negative factors to be considered in the use of the notch grind. In materials of high tensile strength, chip disposal may be a problem because of the stringiness of the chips. There is a greater tendency for drill bushings that are not flush with the work to impede chip flow. Slip bushings may be used to minimize this condition. At high speeds safety shields must be provided.



SINGLE NOTCH DOUBLE NOTCH

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What's Safety Worth in Dollars and Cents?

Unit Drop Forging Division of Fuller Mfg. Co. thinks it's worth a lot. The Fuller people drew up a balance sheet to find out just how much

WHAT is a safety program worth in dollars and cents?

The Unit Drop Forge Division of Fuller Mfg. Co., Milwaukee, drew up a balance sheet to find out; from it was drawn the inescapable conclusion: Safety pays off.

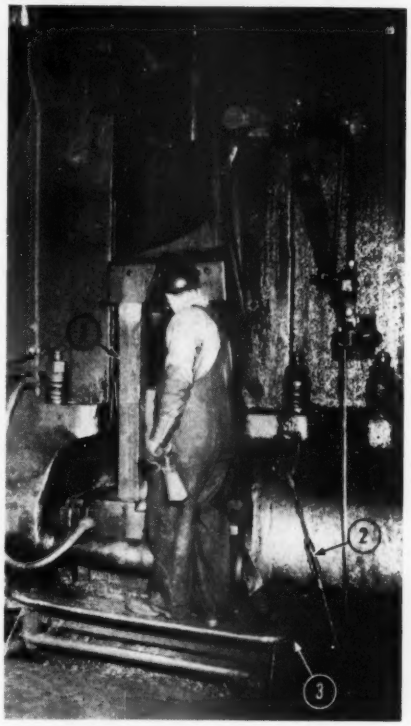
In 1945 when the division's frequency rate was 50.7 (lost-time accidents per million man-hours), the cost of medical and compensation payments was $7197. In 1948, when frequency was reduced to 1.6, such payments were only $1570.

"These alone are substantial savings," says Cedric Olson, works manager of the Unit Drop Forge Division, "but suppose we take the accepted industry figures that the indirect costs of plant accidents are four times the direct costs. That would give us a total figure of $35,985 for 1945 as against $7850 for 1948—a projected total saving of $28,135 as the result of a good year against a poor year accidentwise."

Housekeeping Big Problem—Since anything can happen in a drop forge plant, accidents are likely to be serious when they occur. Drop forging by its very nature is not an orderly industry: Housekeeping is its No. 1 problem. About five years ago the drop forging division suddenly awoke to the fact that the frequency rate with which accidents were occurring in the plant was considerably greater than that in the whole industry (the industry record at that time was higher than it is today). Fuller officials decided to do something.

They called in a safety engineer from their insurance carrier who set up a well worked-out plan that is still in effect: An executive committee was set up. It comprised the division general manager, his assistant, the general superintendent, the works manager, a foreman, the safety director and a registered nurse. The group meets regularly each month. It determines the policy under which the program operates; it reviews activities and accomplishments; it makes careful study of accident records; it determines where greater preventive efforts should be concentrated.

Inspect Plant Regularly — Before the monthly meetings, plant inspections are made by the safety director, one other member of the executive committee and one department foreman who is rotated so all foremen get an opportunity to serve as inspectors.



SURROUNDED BY SAFETY: This Fuller employee is protected by: 1. A safety block under the machine's hammer, 2. a safety lock on the throttle and 3. a heavy treadle guard

Safety is an important factor at weekly meetings of foremen. The safety director leads discussions. Recommendations are received by the executive committee from a union safety committee of three members selected by the union. Each foreman gets a copy of the inspection record report as it applies to his department. The safety director checks twice a week to make sure the committee's recommendations are enforced.

Everything wasn't a bed of roses, though. At first the matter of selling foremen their responsibility for safety presented a problem: Some of the older ones accepted a certain number of accidents as a normal part of the day's work. So a circuit director of the Wisconsin Schools of Vocational and Adult Education came in to give a course in safety to them. The course consisted of ten meetings of one hour each and was attended by foremen during the working day.

Good Records—What were the results of all these efforts? Just this: Nine of 11 shop departments have had no accidents in more than two years.

One department at the end of 1949 was within a month of eight years without an accident. Another department had completed seven full years of no accidents. Three more departments worked more than four years without a lost-time accident.

The company, which picks up the check for the foremen who attend dinner meetings, football games and boxing matches (in appreciation for their co-operation), can now well afford to do so.

No Accidents Since 1948

Westinghouse Electric Corp.'s Trafford, Pa. foundry has established a no lost-time accident record of well over 2 million hours. M. J. Kellner, superintendent, reports there has been no lost-time accident since Dec. 14, 1948.

Got Accident-Prone Workers?

"The conclusion is inescapable that mental and emotional factors account for a large share of our accidents." That's what members of the Pittsburgh Society of Safety Engineers were told by Dr. Dora F. Capwell, director of Allegheny Vocational Counseling Center, Pittsburgh.

The cost of setting any kind of program into motion that could clear up these factors, if undertaken by a single firm, is so high as to virtually prohibit such action. But, thinks Dr. Capwell, a company that cannot afford to set up elaborate methods to spot accident-prone employees or determine areas in which accidents develop because of emotional or physical disturbances can still go to work on a solution. A good accident clinic is the answer, she thinks, and it might be administered at a reasonable cost by a qualified agency outside the company. One thing such an agency would do would be to test ability, job knowledge, interest and personality of injured workers.

Safety Bulletin on Welding

To reduce hazards in electric arc welding a new bulletin has just been published by the accident prevention department of the Association of Casualty & Surety Companies, 60 John St., New York.

Some of the principal hazards referred to in the bulletin include electric shock, flying sparks, and the possibility of inhalation of fumes containing harmful gases. Copies are available through members of the association.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

With all the legal mumbo jumbo it could muster, FTC's legal hierarchy spread enough fog around the steel pricing case consent decree proposal to leave everyone goggle-eyed

ONE THING shown by the arguments about whether or not the steel price case can and should be terminated by a consent order proposed by respondents was this: The Federal Trade Commission's legal staff, after 36 years with the Clayton and Federal Trade Commission acts, still is without a consistent policy of interpretation and enforcement.

The legal staff thinks entirely in terms of legalistic considerations and is not susceptible to arguments based on common sense. Nor is it swayed by normal business needs. Nor by a desire to get businessmen off the horns of a dilemma.

The steel industry proposal, approved by Lynn C. Paulson, the commission's trial attorney in the steel case, was a model of simplicity. It stipulated these five points:

1. Each producer would quote fo.b. mill prices at each producing location.

2. Each producer would be willing to sell at these f.o.b. mill prices when requested to do so by consumers.

3. All producers would refrain from using the freight rate book compiled by the American Iron & Steel Institute.

4. All producers would have the right to absorb freight freely in competing for business.

5. No collusive action would be countenanced in arriving at both base prices and extras.

That kind of settlement—as might have been expected from similar performances over past years—did not appeal to the commission's legal hierarchy.

Long Dissertations — By quoting precedents, and by pointing out where precedent was lacking, it soon stripped the steel proposal of its simplicity and surrounded it with a fog of confusion and uncertainty so thick that observers and the commissioners were left virtually goggle-eyed.

Legal staff members didn't all hold identical views in all particulars. Some thought the commission lacks power to issue an order not backed by admissions and findings of fact. Others opposed the proposed order as being too drastic in one respect or another. All refused to accept Acting Chairman Lowell Mason's plea that they rewrite the order in an acceptable form; they didn't want any part of such a business.

LEGAL STUMBLING BLOCKS
. . . delay steel case settlement

Boiled Down To This — The commission got not one helpful suggestion from its legal lights despite the plea of Chairman Mason that the commission is eager to settle the steel case quickly instead of stringing it along for many years as has been the past practice. It seemed quite obvious that few of the commission's top lawyers had acquainted themselves with the facts in the steel case. In refusing Commissioner Mason's request for assistance in drafting an acceptable order, they flatly stated they were not familiar with the case.

Some observers at the hearings expressed sympathy with the commissioners in the face of these rebuffs. The two new commissioners, John Carson and James M. Mead, who showed by their questions an eagerness to grasp the basic facts in the steel price case, also got a lot of sympathy. They didn't get much help.

The Question—Now being widely asked is this: Has the long era of legalistic bewilderment and confusion in the Federal Trade Commission about run its course? Only the reconstituted commission can answer the question—and the answer well may come as a part of the decision in the steel case. Either the commission will exert its prerogatives and instruct its legal staff as to what it will expect in the future, or it will follow the example of previous commissions by surrendering its authority to the staff—which would mean a continuation of the policy of legalism devoid of horse-sence reasoning.

Some observers in Washington hope that if the former course is followed—if the commission elects to shoulder its own burden of responsibility—it will reorganize its staff to include some men of practical business experience, not just lawyers, among its advisers. One or two ex-sales managers, who are familiar with the real facts of competition for business, could work wonders in introducing some real common sense into the commission's procedure.

RFC Not To Be "Investigated"

ALTHOUGH Sen. J. William Fulbright (Dem., Ark.) was authorized to make another study of RFC loan policies, he had to remove the word "investigation" from his resolution before getting clearance from the Senate leadership.

Majority Leader Scott W. Lucas (Dem., Ill.) objected to the word as implying that something is wrong with the RFC: "There have been no allegations of fraud, corruption, or chicanery involving the RFC," said Senator Lucas. He said he understood all Senator Fulbright had in mind was a thorough study of the RFC "with a view to recommending legislation." So the study will not be punitive, instead it will be aimed squarely at formulation of legislation that will permit reorganization of the RFC in accordance with recommendations of the Hoover commission. It will be conducted by a subcommittee of the Senate Banking and Currency Committee.

National Minerals Body Enlarged

NATIONAL MINERALS Advisory Council has re-elected as its chairman H. M. Albright, president, United States Potash Co., New York, and enlarged its membership from 33 to 44 to take in consumers as well as producers of minerals.

The group, appointed by former Interior Secretary Krug in 1947, initiated proposals, now being studied by the House Ways and Means Committee, to stimulate minerals exploration and development through ade-

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quate depletion allowances and an otherwise more liberal tax policy. It has offices at 1757 K St. N. W., Washington. James A. White is secretary.

Membership includes these men from the metals industries: Alan M. Bateman, New Haven, Conn.; L. M. Brile, Fairmont Aluminum Co., Fairmont, W. Va.; Alex C. Brown, Cleveland-Cliffs Iron Co., Cleveland; Kenneth C. Brownell, American Smelting & Refining Co., New York; Arthur H. Bunker, Climax Molybdenum Co., New York; R. E. Dwyer, Annaconda Copper Mining Co., New York; Andrew Fletcher, St. Joseph Lead Co., New York; Donald B. Gillies, Republic Steel Corp., Cleveland; Marshall L. Havey, New Jersey Zinc Co., New York; Elton Hoyt II, Pickands, Mather & Co., Cleveland; Zay Jeffries, General Electric Co., Pittsfield, Mass.; C. K. Leith, Washington; Lawrence Litchfield, Alcoa Mining Co., New York; Endicott R. Lovell, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.; Frederick R. McIntosh, C. Tennant, Sons & Co., New York; F. S. Mulock, U. S. Smelting, Refining & Mining Co., Boston; John G. Munson, United States Steel Corp., Pittsburgh; Andrew H. Phelps, Westinghouse Electric Corp., Pittsburgh; R. S. Reynolds Jr., Reynolds Metals Co., Richmond, Va.; Joseph M. Viener, Hyman Viener & Sons, Washington; Louis Ware, International Minerals & Chemical Corp., Chicago; H. I. Young, American Zinc, Lead & Smelting Co., St. Louis; R. G. Page, Phelps Dodge Corp., New York.

Get "Hep"

DO YOU KNOW what "push money," "dead time," "split shift," "kick-back," "merit increase," "peg point," "runaway rate," swing shift," "protest price," "real wages" mean?

You, too, can be "hep" to these and many other collective-bargaining terms the next time you sit down at a bargaining table. Just send for a copy of "Glossary of Currently Used Wage Terms," a new 38-page booklet compiled for use of the Labor Department.

Many employers will find it useful. Free copies may be had by writing to the Bureau of Labor Statistics, Washington 25.

Antidepression Measures Sought

SEVERAL government agencies, including the Council of Economic Advisers, again are considering what type of antidepression remedies to recommend in case they're needed.

While there are no public predictions, inside expectations of reliable government economists are that business in calendar 1950 will be approximately 10 per cent under 1949 and that 1951 will show some further drop. Rise of unemployment to a total of 4,480,000 as of Jan. 31 was construed as a strong pessimistic influence.

Small Business Group Stands

THE LONG-DRAWN-OUT fight to keep the Senate Banking and Currency Committee from taking over the range of activities formerly conducted by the Senate Small Business Committee has been won by Sen. Kenneth S. Wherry (Rep., Neb.).

The Senate passed his resolution creating a permanent, standing Small Business Committee; it compares with the special status of the former committee, requiring fresh authorization by each Congress. The new standing committee has the assignment of studying the problems of small business and reporting its findings; it does not have any legislative jurisdiction.

AEC Selects Fluor as Contractor

AFTER CONSIDERING 80 candidates, Idaho Operations Office, Atomic Energy Commission, has selected Fluor Corp. Ltd., Los Angeles, as principal contractor to construct a $20 million materials testing reactor to be built near Arco, Idaho.

Purpose of the plant is to determine the best construction materials for future reactors. Engineering designs have been worked out by the Chemical Plants Division, Blaw-Knox Construction Co., Pittsburgh.

Military: No. 1 Customer

THE MILITARY continues as industry's best customer: Of the $13.5 billion asked by the President for defense in fiscal 1951, about 44 per cent or $6 billion is to be spent directly with American industry. Topping the list is $2 billion for 2713 new aircraft. Substantial amounts are included for new antiaircraft guns, bombs, electrically primed ammunition, guided missiles, rockets, some special railroad equipment, considerable construction equipment and a lot of materials-handling items.

A five-year replacement program of vehicles for the armed services is started with the military budget: Commercial-type vehicles will be bought whenever possible instead of the more costly specially designed tactical vehicles.

New Major Command for Air Force

RESEARCH and development activities have been elevated by the Air Force to the status of a major command, with temporary headquarters in Washington.

Maj. Gen. Gordon P. Saville has been named deputy chief of staff, Research and Development. Maj. Gen. David M. Schlatter has been appointed commanding general, Research and Development Command. Under these commanders, Maj. Gen. Carl A. Brandt and Maj. Gen. Donald L. Putt will continue to supervise overall execution of the research and development program. General Putt says the Air Force, as of June 30, 1949, had in effect more than 400 research and development contracts with total face value of more than $75 million.

For the fiscal year ended June 30, 1950, the armed services had $595.9 million in "estimated obligations" for research and defense expenditures. Breakdown is: Navy $252 million; Air Force $227.4 million; and Army $116.5 million.

The figures represent obligations being accumulated this fiscal year irrespective of whether payment is to be made this year or in some subsequent year.

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FIRST loan approved by the Rural Electrification Administration under the new rural telephone program calls for $243,000 to the Florala Telephone Co., Florala, Ala., for making telephone service available in a three-county area in southern Alabama and northern Florida . . .

Growing acceptance of the prefabricated type of home, says Commissioner Franklin D. Richards, head of the Federal Housing Administration, is shown by the issuance of FHA commitments, during calendar 1949, to insure mortgages of 18,000 such units advanced by private lending institutions; this represents about 50 per cent of the prefabricated houses produced and sold in 1949, compared with about one-third of the total in previous years . . .

Firms desiring contracts involving repairs and alterations of vessels of the Military Sea Transport Service, and who have not yet received word from MSTS, should get in touch with deputy commanders of this service, located at New York, New Orleans, San Francisco, Seattle and Pearl Harbor.

Nationalization Postponed in Britain

Issue is still alive. Final decision on what to do about socialization of steel and other industries put off again until next election probably to be in a few months

IS THE nationalization bomb a dud, or will the thing still go off? That's what British industry—particularly steel—wonders now that the elections have produced a virtual stalemate in Parliament.

With its slim parliamentary lead, the Labor government is not expected to implement the steel nationalization act passed last year nor pursue further socialization of other industries. Action on such major issues will probably be at a standstill until the next election that may be held within a few months. But what then? Another stalemate?

Ramifications of this election outcome will be felt in other European industries. Economic planning in the Ruhr has been hindered because of the possibility that Britain's Laborite member of the Allied Commission for Western Germany might be replaced by a Conservative. That possibility still exists.

Belgium-Luxemburg—playing the role of the lone free-enterprise nation in Western Europe—hoped for a psychological impetus to her performance from a Conservative victory. She got no rotten vegetables, but no wild ovation either.

The pending status in French nationalization plans remains about the same. Public ownership schemes for steel and other industries could be reintroduced by vocal French Communists if the English climate of opinion shifts more to the left.

U. K. Industry Moves Gingerly

British businessmen in the industries threatened by nationalization will be moving gingerly in the months ahead. False steps before the next election might reverse the trend back to labor.

One big problem is prices. Devaluation threatens to push them all up. Businessmen are particularly reluctant to raise their quotations now because of the political situation. A rise in freight charges by the government-owned railroads is anticipated, and this would inevitably bring higher costs in steelmaking.

British steelmakers are in an increasingly competitive tussle with other European producers. Belgian steel exporters have made more price cuts to keep their mills operating. The U. K. steel exports have fallen slightly, but are still good.

The home market demand for steel is high, particularly from the coal, railroad and automobile industries. The National Coal Board is heightening the tempo of its modernization program and is using large tonnages of the metal. British railroads are buying steel to build new rolling stock and relay track. The auto makers are operating nearly at capacity and can't get enough sheet.

NATIONALIZATION BOMB
. . . is it a dud?

The automobile outlook appears good for months ahead because exports are holding up extremely well.

Iron foundrymen are busy because of the auto industry's needs, but shops producing light iron castings for the construction and allied trades need more work. Tight building restrictions throttle their markets.

Ruhr Wants More Steel

Western Germany wants a higher ceiling on steel production; it's now set at 12.1 million net tons. The Germans want a ceiling of 15 or 16 million tons annually. The Allied Commissioners say they can't act before fall at the earliest. Are they waiting for another British election to decide definitely who the commissioner from Britain will be?

An Allied-sponsored embargo on West German steel shipments to East Germany was lifted just two days after the British voters returned Labor to power, at least temporarily.

Demand for Ruhr steel is so heavy that the industry is considering establishment of a voluntary quota system. Both domestic and export orders are large. One home buyer to resume steel purchases is the railroad industry, bolstered by more investment funds.

Another big buyer is the coal industry. Production of hard coal, Germany's major export, will be stepped up as the result of a $37.5 million investment program. Source for the money is counterpart funds which are currencies deposited by Marshall Plan countries to match direct ECA dollar aid.

Much of the money will be loaned to 44 mining companies chiefly in the Cologne, Essen and Aachen area. Production of hard coal is expected to increase from a daily average of 396,000 net tons in December, 1948, to 495,000 tons daily by June, 1953.

Last year Germany exported 20 per cent—about 22 million tons—of its total salable coal. This included 13.2 million tons of hard coal, 7.7 million tons of coke and 110,000 tons of hard coal briquettes.

Belgian Economy Shaky

Belgium would welcome support—political or otherwise—from a Conservative Britain because its economic condition is unstable.

The nation has no natural wealth in its subsoil except coal. Raw materials must be imported, processed and exported. Exports of steel and machinery are below what they were immediately after the war.

The country's high standard of living is endangered. Belgian businessmen see only two alternatives to keep

The Scoreboard

WHAT'S the score in Britain's nationalization program?

Already taken over are the coal mines, railroads, civil air transport, electric power and gas utilities, much of the communications industry and the Bank of England. An act was passed last November to nationalize steel, but it won't be implemented as long as Labor holds its narrow parliamentary lead. If steel were taken over, 20 per cent of the British economy would be state-owned.

Proposed nationalization programs, besides steel, are scheduled by Labor for the cement and sugar industries, cold storage and meat distribution, some wholesale and retail food markets, the few remaining privately owned water supply systems and all suitable minerals.

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up employment: Public works supported by taxes that are already among the highest in the Western world, membership in an European economic union to be on a broader base than the Benelux organization.

More and more Belgians support the latter course. They want a United States of Europe to enlarge their markets, but they would settle for an economic union of the Benelux countries, France and Italy, variously called Fibenel or Fritalux. The union now is in the talking stage only.

French Strikes Serious

Is it just a coincidence that the worst strikes in France since the coal walkout in November, 1948, are occurring at the same time as the British election turmoil?

Paris auto shutdowns are the most serious. They were precipitated by the Communists, but have the support of non-Communist groups. The unions are asking contracts providing higher wages and other benefits. The union leaders can make this demand because the National Assembly last month passed a law legalizing collective bargaining for the first time since the war.

Portugal to Buy in U. S.

Portugal will make its first purchases with Marshall Plan funds.

The country will spend $1,930,000 to buy machinery and equipment, crude oil and petroleum products, aluminum and copper and their products, iron and steel mill materials and motor vehicles, engines and parts. Most of the commodities, totaling about $1,580,000, are coming from the U. S.; the balance of $350,000 from Canada.

Many Make Scientific Apparatus

MANY companies in the U. S. make or distribute a wide variety of scientific apparatus.

STEEL, in the Jan. 23 issue, page 31, erroneously stated that only five companies make a general line. Scientific Apparatus Makers Association classifies the industry's products in this way: Laboratory equipment—such as tables or other built-in laboratory items; laboratory apparatus—such as small furnaces; optical instruments — such as microscopes; and industrial instruments—such as quality control machines.

Lower Tariff Walls Letting in Draft

DOMESTIC makers of sewing machines are feeling the draft from lower U. S. tariff walls. Duty on the imported sewing machine was once 33 per cent of its value, but now it is 10 per cent because of reciprocal trade agreements the U. S. has negotiated with other countries. One result: Increasing competition from foreign producers.

The five American companies that make most of the standard domestic machines are particularly worried about Japanese competition because the Japanese have a large sewing machine production capacity and their prices are low. The American manufacturers are not so much concerned about competition from European machines like the Italian-built Necchi (see photo) and the German-built Pfaff, although 50,000 of the Italian machines have been sold in this country in the past two years.

The Necchi sells for $75 to $100 more than standard U. S. models which range in price from about $140 to $250. The Necchi and the similar Pfaff are elaborate models which find their markets chiefly among dressmakers and semi-professional sewers. The European models have been able to enter the American mass market since the war only because of the shortage in American-built makes.

To keep the tariff valuation down, the Japanese, Italians and Germans ship just the stripped head or sewing mechanism itself to this country. U. S.-built motors activate the head and the whole machine is encased in an American cabinet. Latest available figures, from the Commerce Department's Census of Manufactures for 1947, show that the domestic industry shipped $97,011,000 worth of sewing machines and accessories in 1947; it was $29,707,000 in 1939.

50,000 IN TWO YEARS
. . . because of a shortage

CALENDAR OF MEETINGS

Mar. 6-10, American Road Builders' Association: 47th annual meeting, Netherland Plaza Hotel, Cincinnati. Association headquarters are in the International Bldg., Washington.

Mar. 8, American Society for Testing Materials, Philadelphia District: Meeting on air pollution, Philadelphia. Society headquarters are at 1916 Race St., Philadelphia.

Mar. 10-11, American Foundrymen's Society, Ohio Chapters: Regional conference, Cincinnati. Society headquarters are at 222 W. Adams St., Chicago.

Mar. 14-16, Society of Automotive Engineers: Passenger car, body and production meeting, Hotel Book-Cadillac, Detroit. Society headquarters are at 29 W. 39th St., New York.

Mar. 16-17, Pressed Metal Institute: Technical symposium on cold extrusion of steel, Hotel Carter, Cleveland. Registration fee is $5 for anyone interested. Institute headquarters are at 13210 Shaker Sq., Cleveland.

Mar. 20-25, Concrete Reinforcing Steel Institute: Meeting, at The Shamrock, Houston. Institute headquarters are at 38 S. Dearborn St., Chicago.

Mar. 21-22, Steel Founders' Society of America: Annual meeting, Edgewater Beach Hotel, Chicago. Society headquarters are in the Midland Bldg., Cleveland.

Mar. 22-23, Malleable Founders' Society: Market development conference, Evanston, Ill., in co-operation with Northwestern University. Society headquarters are in the Union Commerce Bldg., Cleveland.

Mar. 24, Malleable Founders' Society: Western sectional meeting, Drake Hotel, Chicago. Society headquarters are in the Union Commerce Bldg., Cleveland.

Mar. 28-31, Society of the Plastics Industry: Fourth national plastics exposition, Navy Pier, Chicago. Society headquarters are at 295 Madison Ave., New York.

Mar. 29, Material Handling Institute Inc.: Meeting, Hotel Cleveland, Cleveland. Institute headquarters are at 1108 Clark Bldg., Pittsburgh.

Apr. 3-4, Association of Iron & Steel Engineers: Spring conference, Birmingham. Association headquarters are in the Empire Bldg., Pittsburgh.

Apr. 4-7, National Association of Corrosion Engineers: Sixth annual conference, Hotel Jefferson, St. Louis. Association headquarters are in the Milam Bldg., Houston.

Apr. 5-7, Midwest Power Conference: Sponsored by Illinois Institute of Technology and 18 universities and professional societies, at Sherman Hotel, Chicago. Conference director is Roland A. Budenholzer, Illinois Institute of Technology, 3300 S. Federal St., Chicago.

Apr. 5-7, American Institute of Electrical Engineers: Second conference on electric welding, Rackham Educational Memorial Bldg., Detroit. Institute headquarters are at 33 W. 39th St., New York. Cooperating societies are American Welding Society and Industrial Electrical Engineers' Society of Detroit.

Apr. 10-12, Iron & Steel Division, AIME: 33rd annual conference, Netherland Plaza Hotel, Cincinnati. AIME headquarters are at 29 W. 39th St., New York.

Apr. 10-12, American Society of Lubrication Engineers: Annual convention and show, Hotel Statler, Detroit. Society headquarters are at 343 S. Dearborn St., Chicago.

Apr. 10-14, American Society of Tool Engineers: Industrial exposition, Philadelphia Convention Hall, Philadelphia. Society headquarters are in the ASTE Bldg., 10700 Puritan Ave., Detroit.

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This "new arithmetic in steel" is in step with industry's trend to the use of improved steels. When cold-rolled steel was found to be preferable to hot-rolled for many uses, industry substituted cold-rolled for hot in these uses. Today, it is equally logical and economical to replace simple carbon sheets with low-alloy high-tensile.

N-A-X HIGH-TENSILE makes it possible to reduce sections by 25% ... and *still provide* greater strength and durability than can be obtained with thicker sections of mild-carbon steel! Each ton of N-A-X HIGH-TENSILE steel represents a potential 33% increase in finished goods. Manufacturers are finding that N-A-X HIGH-TENSILE enables them to get 33% greater usefulness out of steel supplies.

Investigate this great opportunity to make each ton of sheet steel go farther ... through the superior quality of N-A-X HIGH-TENSILE.

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Motor industry feels pinch of coal shortage. Overtime eliminated and shorter work-weeks appear probable as steel mill operations dip. More cutbacks if there's no coal

DETROIT

WHILE spring may be just around the corner business sentiment in the auto industry remains midwinterish, with continuation of production a touch-and-go proposition, hanging on the early resumption of coal shipments. Six weeks of negotiations in the Chrysler strike have added up to exactly nothing and the 89,000 idled at Chrysler plants continuing to suffer wage loss of $1,188,772 every day. Last week boosted their total loss to well over $30 million. An increasing number of production cutbacks elsewhere was being looked for because of the coal crisis and if it should continue another week plants could be slowed to a walk.

Ford has banked one blast furnace and placed coking operations on a 32-hour cycle, thus cutting open-hearth steel output by about 20 per cent. Power house and steel mill furnaces have been converted partially to fuel oil, with greater usage being made of natural gas. Meanwhile, overtime schedules have been abandoned, and it appears problematical how much longer a five-day week can be continued.

Set 20-year Record — The slash came just after a new 20-year daily record of 7777 passenger cars, trucks and tractors was rung up on Feb. 16. Of this total 4543 were Ford passenger cars, another daily record. It climaxed a steady upward pull in production since the first of the year toward a projected goal of 8220 vehicles of all types.

The long-range outlook at Ford remains as bright, or brighter, than ever. Latest expansion project involves conversion of a parts and accessories building at the Rouge plant to motor building. The structure was built during the war for production of Pratt & Whitney Aircraft engines, and construction work on the conversion will begin in October to meet a production schedule one year later. A new central parts depot, covering 950,000 sq ft of floor space, is being built at Plymouth and Middlebelt roads in Livonia township for occupancy this summer, while a second new parts depot will handle Lincoln-Mercury requirements.

Foundry To Be Expanded—Machining operations in the present Rouge casting machine plant will be transferred to the new motor plant and the production foundry expanded into the vacated space. The foundry will continue operations throughout the expansion. The present steel foundry will be re-equipped and converted to production of crankshafts and exhaust valves for use in the new motor plant.

The move will at once free-up motor building at the Rouge, which has become overcrowded and to a certain extent obsolete, and will permit alteration of the foundry layout, also long contemplated. Production will be centered on V-8 engines and to some extent will be integrated with the new Cleveland foundry and motor plant, where both V-8s and sixes will be manufactured.

Involve $100 Million—Nothing like the vast expansion of Ford operations, under way for the past four years, has ever been seen by the automotive industry. The projects involve expenditure of at least $100 million per year and the complete program has yet to be revealed. Tempo of construction at the new Cincinnati transmission plant and the Pressed Steel unit at Hamburg, N. Y., is being stepped up, while hiring of production workers at the recently purchased Monroe, Mich., plant has begun. Personnel employed thus far includes former Kelsey-Hayes men who have been released to fill Ford production jobs, specialists in the die casting field and maintenance crews. Additional help will be recruited from Flat Rock, Mich., and Hamilton, O., plants which are moving to Monroe. The latter facility brings to eleven the number of manufacturing plants now comprising the company's parts and equipment manufacturing division. Among other features, all of them do now or eventually will reflect distinctive new techniques in the mechanical handling of parts in process — or automation, as it is called in the modern vernacular.

Auto, Truck Output

U. S. and Canada

	1950	1949
January	616,642*	445,092
February	508,000*	443,734
March		543,711
April		569,728
May		508,101
June		623,689
July		604,351
August		678,092
September		†657,073
October		601,021
November		†474,731
December		†384,318
Total		†6,533,641

Weekly Estimates

Week Ended	1950	1949
Feb. 11	125,737	108,911
Feb. 18	123,712	114,207
Feb. 25	126,737	118,815
March 4	120,000	118,267

Estimates by Ward's Automotive Reports

* Preliminary.
† Final revision by Automobile Manufacturers Association.

Car Scrappage Increases

LATEST figures to be assembled by R. L. Polk & Co. on the scrappage of passenger cars last year show that the rate approached the prewar yearly average. Studies indicate that 1,220,041 passenger cars and 484,038 trucks went off the road last year. Scrappage of trucks was twice that of a normal year, suggesting that general debility is finally overtaking trucks in service.

The 1,220,041 passenger cars which failed to reregister (considered scrapped) compares with the 25-year average scrappage of 1,601,940 units a year, and while scrappage amounted to 25.22 per cent of all new cars registered during the year, it was only 3.45 per cent of the cars on the road. A total of 13,407,990 passenger cars, or nearly 38 per cent are postwar models.

In the truck field a different story is seen. A total of 384,038 trucks disappeared from registrations during the year, as compared with the 25-year average scrappage of 258,980. Polk figures that the high mileage piled up by trucks during the war undoubtedly has taken a big toll, the scrappage rate being one truck junked for every two new ones built. The 1949 scrappage amounted to 50.3 per cent of all new units registered, but represented only 6.4 per cent of the total in operation.

Since "scrappage" is virtually the replacement market, the figures mean that the auto industry's re-

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placement requirements are about 1.5 million passenger cars and 500,000 trucks. During the 25-year period 1924-1949, Polk scorekeepers disclose that 40,048,512 passenger cars and 6,474,494 trucks have been scrapped. These totals are arrived at arithmetically by subtracting registrations as of Dec. 31, 1949, from the total number of cars and trucks registered during the quarter century.

GM Cuts Prices, Wages

PRICE reductions of $10 to $40 in its entire line of cars and trucks coincided with the announcement of a downward adjustment in the cost-of-living allowance paid to General Motors' approximately 362,000 hourly-rated and salaried employees for the months of March, April and May. It was the third time within the last year that GM has reduced prices to pass along to customers the savings resulting from the downward trend in the cost-of-living notwithstanding the increased prices now being paid for steel and some other commodities.

Under terms of the GM wage adjustment formula, revision of the cost-of-living allowance on Mar. 1 resulted in a decrease of 2 cents per hour for hourly-rated personnel and a $10 quarterly reduction in the allowance paid to salaried employees. The changes are based on the BLS index, which for Jan. 15 stood at 166.9, comparing with 168.5 for Oct. 15, 1949. Net effect of the tie-in of wages to the index, plus an annual improvement factor, has been an increase of 9 cents per hour in base rates since adoption of the formula in May, 1948.

As expected, the UAW-CIO took umbrage at the adjustment. Contending that while it recognized the "technical legal right of the corporation to reduce wages 2 cents an hour, the profit position of GM makes such a reduction morally indefensible," adding that "when the contract was signed it was hardly anticipated that GM would set a world record of more than $600 million in profits after taxes." When negotiations start next month on a new contract, the union is expected to press for rejection of any continued gearing of the wage level to the cost-of-living index.

K-F To Speed New Models

KAISER-FRAZER now believes it can get going on new models two weeks ahead of schedule, with the Frazer line starting to move last week to permit completion of production models by Mar. 10. Rehiring of plant personnel will be speeded up daily until the latter date, when further acceleration is planned coincident with the start of a second assembly line for the '51 Kaisers. It is hoped to beat the previously announced date of Mar. 31 for the Kaiser group.

Safety Big Business

INDUSTRIAL safety is big business. Thus, the Ford safety and health department, operating 28 hospitals and 35 first aid stations, has at the Rouge plant one which is claimed to be the country's largest industrial hospital, headed by a staff of 14 doctors. Last year doctors and nurses handled nearly 850,000 treatments, the great majority of which had nothing to do with accidents, incidentally. In a single year, the medical staff estimates it issues free to employees about 1.7 million aspirin tablets, 500,000 cold tablets, 2000 tubes of salve for sore muscles (induced by weekend activity), 1500 bottles of citrocarbonate and 30 tons of protective cream of various kinds. On top of that, the safety department issues 3.6 million pieces of safety equipment each year and supervises the installation and operation of better than 2000 different types of safety guards on machines and equipment.

At that the company figures its employees are safer at work than at home. The Ford Dallas plant recently went more than 17 months, chalking up around 4 million man-hours, without a single lost-time accident, Louisville more than 13 months and 3 million man-hours, Metuchen 14 months and 3.5 million man-hours; Buffalo has crossed 1.7 million man-hours.

JEEP GOES UNDERGROUND: Operators of the Dulin Mining Co.'s Nutt-Bailey bauxite mine at Sweet Home, Ark., say that this type of converted Jeep unit has made possible a ten-fold increase in bauxite production. The tandem-size type hauling frame on the Jeep converted it to a mine vehicle. The hazard of monoxide gas was eliminated in the engine by blocking off the gasoline fuel system and installing a butane fuel system

Auto Engineers To Gather

NEXT week should see a large crowd of engineers in Detroit for the SAE's national passenger car, body and production meeting. A feature of the Wednesday meeting will be a series of eight informal "clinics" on subjects including materials handling, production and manufacturing control, gear design and production, preventive maintenance of equipment, inspection and quality control, surface finish, steel heat treating, and body steel. Other sessions will offer a dozen or more formal papers on various phases of engine development, glass, brakes and suspensions, and industrial waste disposal. Featured speaker at a dinner meeting will be Del S. Harder, Ford vice president—manufacturing.

New Era for Engines

AUTOMOBILE engines are now entering a new era, and car owners will get better mileage, power and performance from new cars, thinks Henry Ford Jr.

Lucky They're Not Coal Burners

THE FEDERAL government operates 237,000 autos, trucks, busses, station wagons, ambulances and other vehicles. The figure doesn't take into account the combat vehicles of the military department.

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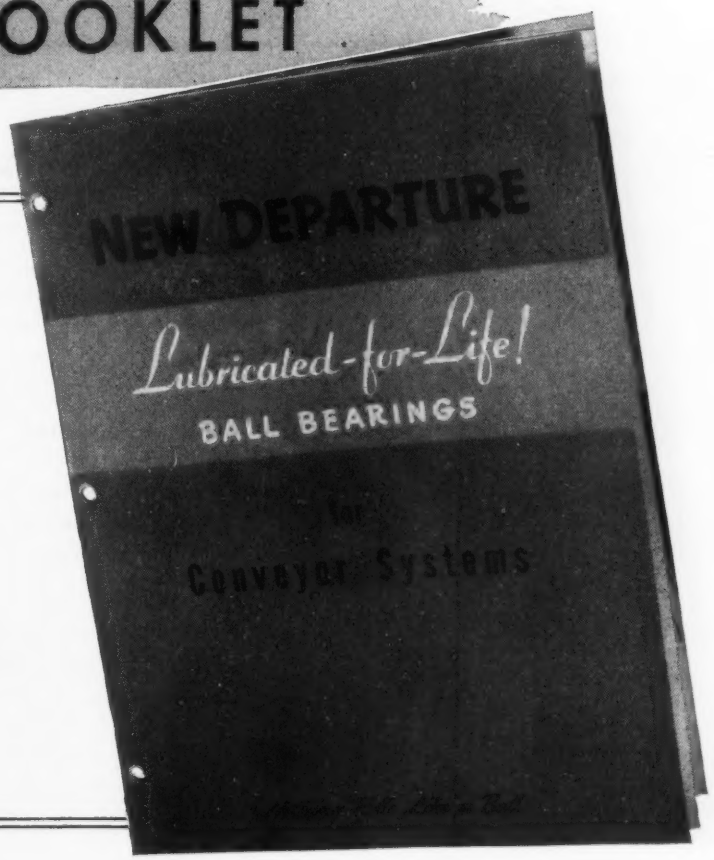

MORE THAN any other single invention perhaps, the mechanized conveyor system lifts the load off man's back and puts it on the machine.

It is a typically American invention, and it represents a typically American way of getting things done.

By originating and developing ball bearings which are lubricated-for-life and are sealed to keep dirt out, New Departure made a contribution of major importance to the modern conveyor system.

Proved in installations operating under rugged conditions, in temperatures from below zero to desert heat, and exposed to dust and dirt . . . carriers developed around these lubricated-for-life conveyor bearings are giving years of service without any cost for greasing.

The story of New Departure Conveyor Bearings and the services that go with them is told in a new booklet, illustrated above.

If you design or manufacture or use conveyor systems, you will find it interesting and helpful reading. Mailed promptly, to requests on business letterheads.

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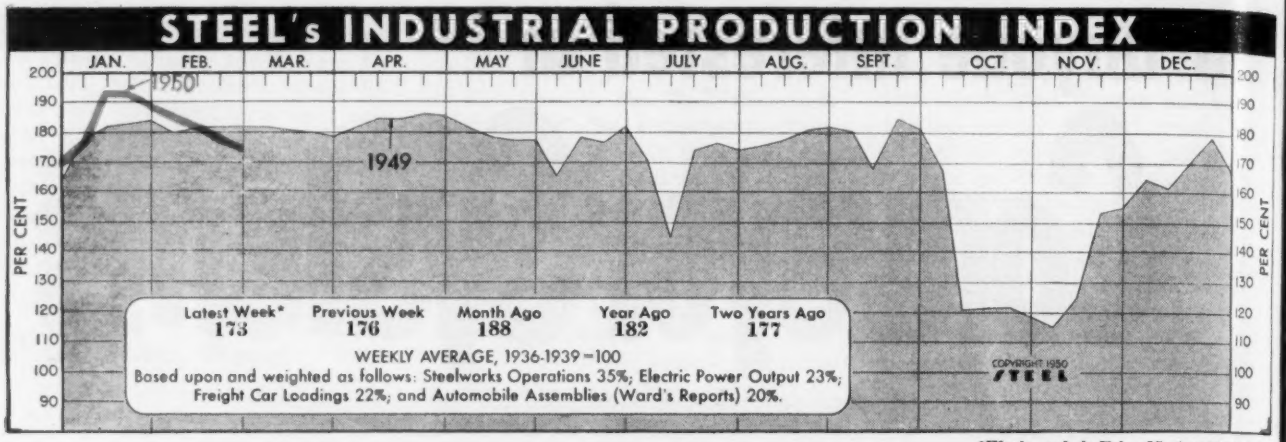
STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1950
1949
PER CENT
Latest Week* 173
Previous Week 176
Month Ago 188
Year Ago 182
Two Years Ago 177
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
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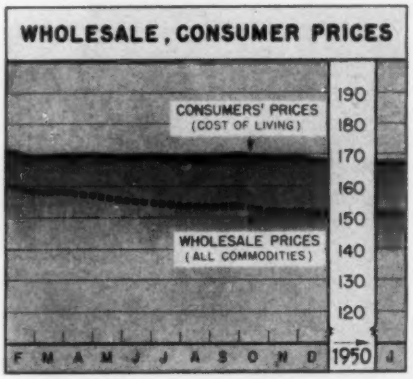
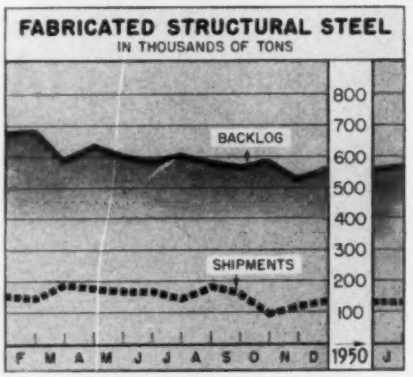
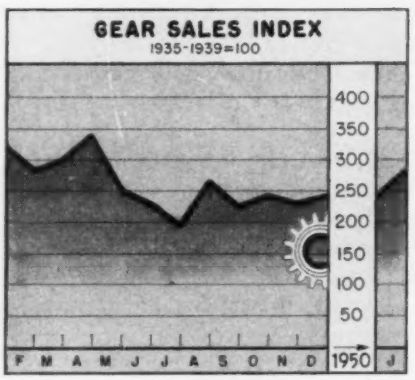
*Week ended Feb. 25 (preliminary).







Charts—Copyright 1950, STEEL

Price Indexes

	Wholesale 1950	Wholesale 1949	Consumers 1950	Consumers 1949
Jan.	151.6	160.5	166.9	170.9
Feb.	....	158.1	....	169.0
Mar.	....	158.4	....	169.5
Apr.	....	156.9	....	169.7
May	....	155.7	....	169.2
June	....	154.4	....	169.6
July	....	153.4	....	168.5
Aug.	....	153.0	....	168.8
Sept.	....	153.6	....	169.6
Oct.	....	152.2	....	168.5
Nov.	....	151.6	....	168.6
Dec.	....	151.3	....	167.5
Average	....	154.9	....	169.1

Bureau of Labor Statistics

Fabricated Structural Steel

Thousands of Net Tons

	Shipments 1950	Shipments 1949	Backlog 1950	Backlog 1949
Jan.	131.5	152.7	565	675
Feb.	....	145.9	...	683
Mar.	....	185.9	...	582
Apr.	....	179.2	...	628
May	....	171.1	...	599
June	....	172.3	...	583
July	....	148.0	...	605
Aug.	....	183.9	...	583
Sept.	....	162.1	...	562
Oct.	....	99.8	...	584
Nov.	....	117.2	...	527
Dec.	....	135.5	...	555
Total	....	1,853.5	...	...

American Institute of Steel Construction

Gear Sales Index

1935—1939=100

	1950	1949	1948
January	280.2	320.7	346.8
February	....	282.3	324.4
March	....	299.1	389.8
April	....	339.0	320.9
May	....	250.1	283.6
June	....	227.8	324.1
July	....	193.1	384.4
August	....	262.0	335.6
September	....	224.9	320.4
October	....	242.3	333.3
November	....	230.7	309.0
December	....	242.8	325.9

American Gear Mfrs. Assoc.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Building Const. Feb.27	Ironers, Standard ..Jan.2	Steel Castings Feb.27
Employ., Metalwkg..Jan.2	Machine Tools Feb.27	Steel Forgings Feb.20
Employ., Steel Feb.20	Malleable Castings.Feb.27	Steel Shipments....Feb.13
Fab. Struc. Steel...Feb.13	Mfrs. New Orders .Jan.2	Trucks, Elec. Ind...Jan.2
Fdry. Equipment ...Feb.13	Pumps Jan.2	Vacuum Cleaners...Feb.27
Freight Cars Feb.27	Ranges, Elec. Jan.2	Wages, Metalwkg. .Jan.2
Furnaces, Indus. ...Jan.2	Ranges, Gas Jan.2	Washers Jan.2
Furnaces, W. Air...Jan.2	Screw Mach. Prod. .Jan.2	

Index Declines 4 Points

In the week ended Feb. 25 STEEL's industrial production index declined for the fifth consecutive time to a preliminary 173 per cent of the 1936-1939 average. The preceding week's index was 176 and in the like week a year ago the index was at 182.

The decline from the level for the preceding week matches the drop in the weighting assigned to the steelmaking rate. Automotive production advanced slightly and electric power output was down from the preceding week.

Consumers' Prices Ease

Bureau of Labor Statistics consumers' price index (cost of living) on Jan. 15 was 0.4 per cent lower than on Dec. 15. At 166.9 per cent of the 1935-1939 average the latest figure is 2.3 per cent lower than a year ago.

All major groups comprising the index declined, except rent and fuel, electricity and refrigeration. The largest decrease was 0.7 per cent in the foods group. Prices of fuel, electricity and refrigeration advanced 0.2 per cent and rents 0.3 per cent.

Prices of house furnishings declined 0.4 per cent between mid-December and mid-January and on the latter date were 6 per cent below a year ago.

Structurals Down in January

Fabricated structural steel shipments and bookings in January were below month ago and year ago levels. American Institute of Steel Construction totals show shipments were down to 131,468 tons from 135,500 tons in the previous month and 152,746 tons in January, 1949. Bookings dropped slightly to 116,987 tons compared with month ago and year ago figures of 124,251 tons and 130,418 tons, respectively. Backlog for the next four months stands at 564,577 tons.

The Business Trend

Worries about poststrike operations are another reason why metalworking executives are losing sleep. Their present production problems are no sedative either

INCREASING worry about the long term is being coupled with the immediate problem of keeping plants going with fuel and materials shortages. Metalworking companies may find another round of metals shortages complicating their production plans early in the second quarter.

Most steel consumers were able to continue operations during the steel strike in October and November. After the strike many found it necessary to slow down until supply pipelines began to fill. Automotive companies were the hardest hit, but they used part of this time for taking yearend inventories and getting ready for new models. A drop in steel shipments now will have a similar delayed effect.

Too little time has elapsed for metalworking companies to build up inventories since the end of the steel strike. As rolling mills either miss turns or are shut completely, short shifts or shutdowns will become very common in metal consuming plants.

Even those companies not forced to rely on coal to maintain their operations are in a tight spot because of gas and electric power rationing from utilities. The weather is an important factor in maintaining operations. Availability of both gas and electric power is in direct relation to the position of the mercury in the thermometer.

Coal . . .

Bituminous coal production in 1950 up to last weekend was about 44 million tons. In the like period in 1949 output was slightly over 100 million tons. Operations in the coal fields are confined almost entirely to mines employing nonunion and Progressive Union miners. Weekly output is about 2.5 million tons per week.

Steel . . .

Like the snowball rolling down hill the steel rate is gaining momentum in its descent. No longer are cutbacks scattered and confined to reducing blast furnace operations. Open hearths and rolling mills are joining the casualty list in rapid succession. In the week ended Feb. 25 the output of steel for ingots and castings dropped 4.5 points to 85.5 per cent of capacity. Last week the decline was even sharper.

Automobiles . . .

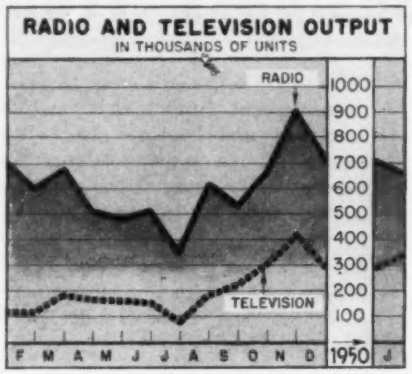
Passenger car outturn is hardest hit as the automotive industry struggles with growing shortages. February car volume for U. S. plants is estimated at 383,430 units, compared with 490,100 in January. Trucks fared better with a dip to 91,200 from 97,640 in January. Canadian plants added 24,642 cars and 9172 trucks. Overtime operations have been abandoned by the industry to conserve dwindling supplies and full-day stoppages appear to be just around the corner.

FRB Indexes . . .

Industrial production in February dropped less than 3 per cent from the January level, estimates the Federal

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	85.5	90.0	94.0	100.0
	Electric Power Distributed (million kilowatt hours)	5,854	5,931	5,972	5,559
	Bituminous Coal Production (daily av.—1000 tons)	404	417	1,210	1,809
	Petroleum Production (daily av.—1000 bbl.)	5,000	4,997	4,956	5,401
	Construction Volume (ENR—Unit $1,000,000)	$263.6	$120.0	$216.4	$75.6
	Automobile and Truck Output (Ward's—number units)	126,737	123,712	141,036	118,815
	*Dates on request. †1950 weekly capacity is 1,906,267 net tons. 1949 weekly capacity was 1,843,516 net tons.				
TRADE	Freight Car Loadings (Unit—1000 cars)	554†	560	636	688
	Business Failures (Dun & Bradstreet, number)	210	218	232	180
	Money in Circulation (in millions of dollars)‡	$27,019	$26,993	$26,913	$27,551
	Department Store Sales (changes from like wk. a yr. ago)‡	+1%	none	none	−9%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$12,693	$11,204	$13,556	$11,421
	Federal Gross Debt (billions)	$256.5	$256.7	$256.8	$252.6
	Bond Volume, NYSE (millions)	$16.0	$14.3	$21.5	$14.8
	Stocks Sales, NYSE (thousands of shares)	6,316	8,849	7,435	3,427
	Loans and Investments (billions)†	$67.0	$67.1	$67.7	$62.0
	United States Gov't. Obligations Held (millions)†	$36,975	$37,375	$38,131	$32,890
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	156.13	156.13	156.13	155.05
	STEEL's Nonferrous Metal Composite‡	159.7	159.9	159.9	232.6
	All Commodities†	152.5	152.2	150.7	158.5
	Metals and Metal Products†	169.4	169.3	169.3	175.4
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				

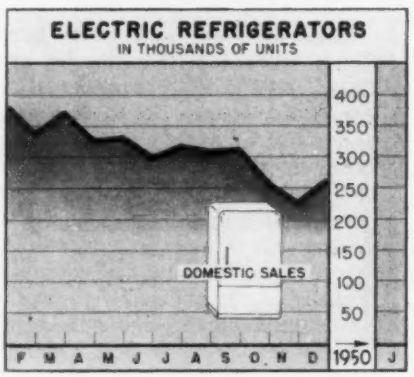


Radio and Television Output

Thousands of Units

	Radio		Television	
	1950	1949	1950	1949
Jan.	660	710	336	121
Feb.	...	598	...	119
Mar.	...	679	...	182
Apr.	...	506	...	167
May	...	478	...	163
June	...	512	...	161
July	...	342	...	80
Aug.	...	623	...	186
Sept.	...	532	...	225
Oct.	...	670	...	305
Nov.	...	910	...	414
Dec.	...	707	...	292
Total	...	7,247	...	2,414

Radio Manufacturers Assoc.

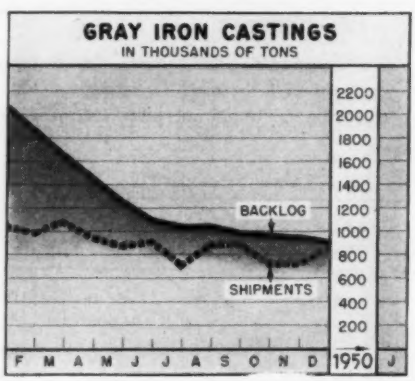


Electric Refrigerators

Domestic Sales—Units

	1949	1948	1947
Jan.	380,853	272,121	196,855
Feb.	337,424	281,580	169,450
Mar.	369,216	338,109	230,672
Apr.	324,370	330,720	250,623
May	330,753	317,763	263,785
June	296,199	373,115	273,531
July	315,444	351,094	259,075
Aug.	307,622	281,345	199,001
Sept.	309,429	344,260	268,628
Oct.	252,580	380,854	294,659
Nov.	221,221	374,470	272,072
Dec.	259,158	330,660	315,946

National Electrical Mfrs. Assoc.



Gray Iron Castings

Thousands of Net Tons

	Shipments		Backlogs*	
	1949	1948	1949	1948
Jan.	1,040	1,064	2,065	2,803
Feb.	987	1,024	1,857	2,769
Mar.	1,075	1,169	1,639	2,726
Apr.	929	1,051	1,446	2,691
May	867	993	1,243	2,602
June	906	1,072	1,087	2,587
July	697	914	1,032	2,601
Aug.	872	1,051	1,048	2,599
Sept.	881	1,088	980	2,587
Oct.	716	1,148	955	2,523
Nov.	719	1,100	939	2,407
Dec.	862	1,111	892	2,284
Total	...	12,786		

* For Sale. Bureau of the Census

Charts—Copyright 1950, STEEL

Reserve Board. January's total seasonally adjusted figure just released by the board was 183 per cent of the 1935—1939 average, compared with 180 in December and 191 in January, 1949. Both durable and nondurable goods industries as a whole shared in the January pickup. Durable goods index was 210, a 6 point rise from the preceding month.

Construction . . .

Civil engineering construction volume continues at a brisk pace. Awards reached $263.6 million in the week ended Feb. 23. Cumulative total for the first eight weeks of 1949 is nearly $1602 million, 42 per cent above the corresponding period a year ago.

Business . . .

Both business failures and current liabilities set high marks in January. January's failure total was 864, second highest since May, 1942. Current liabilities rose to $26,436,000, higher than in any corresponding period.

Railroads . . .

Class I railroads had 1142 locomotives on order on Feb. 1, says Association of American Railroads. These included: 1126 diesel, 4 electric and 12 steam locomotives. A year earlier they had 1490 diesel and 73 steam locomotives on order for a total of 1563. In January the railroads installed 100 diesels and 1 steam locomotive; they had 129 diesel and 7 steam locomotives that time in 1949.

Prices Generally Steady

General Motors reduction does not necessarily indicate downward trend for industrial goods

DON'T attach too much importance to the price and wage reduction by General Motors on the basis of a lower consumers' price index. Other price indicators continue strong.

Although some pressure for price trimming is noted, wholesale price slashes are not on the horizon. A consumers' price index decline from 3 to 5 per cent, a forecast in STEEL's Metalworking Yearbook (p.101) still looks like a good bet.

Geared to Reduction—GM's action in reducing prices from $10 to $40 is based on the movement of the Bureau of Labor Statistics consumers' price index for the three months ended Jan. 15. It is the third such reduction by the company and the preceding two led to no general price cuts, even in the automotive field. In recent months automatic transmissions have been cut from 15 to 20 per cent, the reason for reductions given being "mass production economies." Fairly sizable cuts have been announced by the industry's independents but the Big Three who built 80 per cent of the automobiles last year have reduced their list prices only slightly.

In truck prices competition has forced larger reductions. That seems to be the answer—price reductions in fields of intense competition.

Some Pressure Up — Not all the price pressure is downward. Construction men expect prices to go up this year. They contend the construction industry absorbed higher costs in 1949 and can't hold the line any longer. If their unions win pensions this year, the advance is certain, they say.

Even in the field of price indexes there is no indication that the fall will continue. BLS wholesale price index for January rose 0.2 per cent. Increases of more than 0.5 per cent were recorded in fuels and lighting materials and in building materials. Structural steel, fats and oils and crude rubber advanced over 3 per cent in January. Small weekly increases continued into February with the bureau's weekly index for the week ended Feb. 21 reaching 152.5, a position 1.2 per cent over four weeks earlier.

Stabilization — Nonferrous prices have stabilized since the first of the year except for slight day-to-day variations in the tin price. Copper, lead and zinc prices are the same

UNIVERSITY OF MICHIGAN LIBRARIES

now as they were at the end of November. Aluminum is unchanged since October, 1948.

Iron and steel scrap prices are in the area of greatest possible change. Mills have confined their buying to purchases from consumers in recent months and the scrap market has no strength although price changes have been slight since the first of the year. Developments in scrap depend on future steel mill operations. Large cutbacks in steelmaking could kick the props from under a sagging market.

Small Cuts—So far the price reductions have been too small to overshadow the advance in steel prices last December. Metalworking companies who hope to trim their prices to meet competition will have to reach their goal by shrewd buying and manufacturing economies. The easy way of getting there—by lower prices for raw materials—is not yet here.

Prices May Stay Firm

Business for Westinghouse Electric Corp. will be good this year, says Gwilym A. Price, president. "It may not be as good as last year, but will certainly be within shooting distance," he explains.

He looks for prices to remain firm, "if not on the rising side." He thinks costs will continue to rise, thus precluding the likelihood of any easing in prices.

He anticipates continued strong demand for steam generator and transformer equipment, even though there may be an overall lag in demand for industrial products.

Production of television sets will be between 4 and 5 million units this year, Mr. Price believes, and the nation will absorb all the sets made.

Unsatisfied Demand—Despite currency devaluations abroad, the company's export business this year should be comparable to 1949, when foreign shipments amounted to 8.6 per cent of overall business. There is still an unsatisfied demand abroad for high voltage equipment which will tend to sustain Westinghouse exports. In low voltage equipment, competition of foreign builders is becoming increasingly keen. England provides the stiffest competition. Belgium and Germany are becoming more active. Switzerland is competing and only recently Italy entered the world market as a seller. Only France of the major European countries is making little or no effort to compete abroad.

At the same time, Mr. Price looks for foreign manufacturers to make no "real inroads" in the domestic market. There have been instances of municipalities buying foreign equipment because lower prices were a dominating factor, he admits, but adds the importance of servicing will continue to swing the balance of buying to domestic manufacturers.

Business Leveling Off

The upswing in business, following the steel strike, continued in February, but at a slower pace than January, says National Association of Purchasing Agents.

The trend has leveled off at the increased rate reached in December and January. General business would have been much better in February had it not been for the coal strike. Goods for spring retailing may be slow in reaching dealers' shelves.

The price movement is slowly upward, with a tendency to stabilize. Industrial inventories continue to fall. Employment is slackening and buying policy conservative. Of the companies checked, 78 per cent are buying within a 60-day range.

Purchasing agents, comparing their policies on inventory, commitments and purchasing with a year ago, generally are following the conservative procedures established early in last year's business decline — and find them applicable to present unsettled conditions.

Despatch Gets Big Order

Despatch Shops Inc., Rochester, N. Y., has received an order for 3000 new freight cars which will mean an increase of about 300 workers by June. Production on the new order will begin in June after completion of 1000 refrigerators cars.

Will Freight Cars Go Downgrade Again?

WILL the freight car buying boom let run out of steam? The revival in freight car orders got off to a slow start last November and picked up headway after the first of this year but the reduced rate of railroad operations may be a road block.

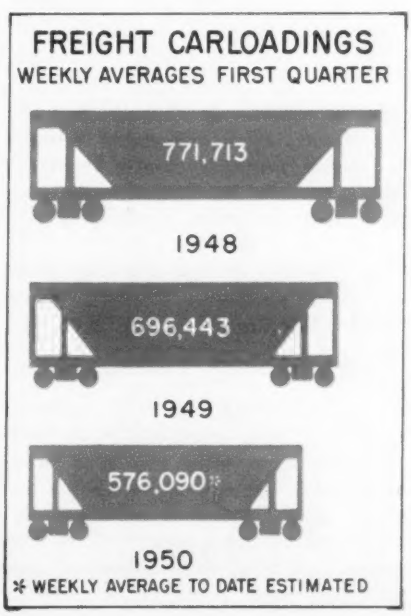
Operating revenues are decreasing; operating costs are rising; net incomes are melting away. Class I railroads' net income in 1949 dropped to $436 million after interest and rentals from $698.2 million in 1948. This represents a rate of return on net property investment of 2.91 per cent, compared with 4.38 per cent in 1948. Railroad operating revenues in January dropped an estimated 10.8 per cent, compared to the like month last year, says the Association of American Railroads. An even sharper drop is certain for February because of a lower operating rate forced by the coal strike.

Loadings Drop — Freight carloadings, major source of railroad revenue and profit, are down sharply this year in relation to the preceding two years. Average weekly carloadings shown in the accompanying chart are down almost 200,000 cars weekly from 1948 and about 120,000 cars from 1949. The 1950 average is for the first nine weeks of this year and will probably go lower unless the flow of coal is resumed in time to prevent further industrial shutdowns.

Strike Losses Heavy—Pennsylvania Railroad's strike loss was $45 million in 1949, estimates Walter S. Franklin, president. Its net income dropped to $12.5 million from $34.4 million a year earlier. If even a fraction of this loss went into the purchase of new freight cars, it would be a sizable boost to the car builders.

Operating cutbacks in the future will be minimized by the trend to dieselization. Operating economies realized by using diesels may free more funds for car buying but the short term effect will run a countercourse. As Mr. Franklin explains, "dollar investment incident to diesel locomotive use is greater than for any other single undertaking in the history of the company."

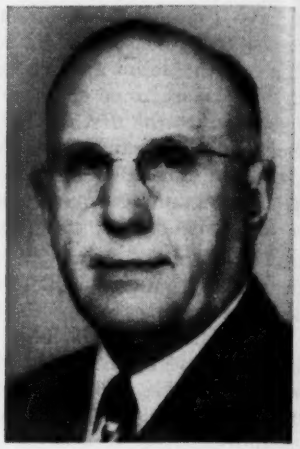
Although some of the railroads are expected to place orders after end of the coal strike, the orders for the entire year will be watered down from what they might have been. Car builders who urgently need the business, will probably have to wait patiently a little longer.



Men of Industry

T. R. FARLEY

FRANK F. CAMBEST



PETER T. MATZEN

T. R. Farley, vice president, **Caterpillar Tractor Co.,** Peoria, Ill., was named general manager of the new Caterpillar plant located two miles southwest of Joliet, Ill. During the war he held executive posts with the subsidiary, Caterpillar Military Engine Co., of which he was elected president in 1944 and continued in that capacity until products from that plant were no longer required by the War Department. The engine company was dissolved in 1946. He returned to Peoria and since that time has been in charge of special projects for the company.

—o—

Carl A. Day was appointed head of manufacturing, **Bausch & Lomb Optical Co.,** Rochester, N. Y. Assisting him with manufacturing responsibilities which include operations at plants at Wellsville, N. Y., and Midland, Canada, are **Harry O. Flodin, Edward J. Reh, Otto E. Trautman, Vincent M. Young, J. J. Graffley,** and **Harry N. Bedford,** superintendents.

—o—

Nichols Wire & Aluminum Co., Davenport, Iowa, appointed **Edward C. Manix** manager, South Deerfield, Mass., branch. He formerly was manager and treasurer, Arms Mfg. Co.

—o—

Carl L. Sadler Jr. was appointed chief engineer, hydraulic division, **Sundstrand Machine Tool Co.,** Rockford, Ill.

—o—

V. R. Bates was appointed manager, cold-rolled strip sales, and **N. J. Froelich,** manager, wire and wire products sales, **Detroit Steel Corp.,** Detroit. **J. M. Gillard** is manager, Detroit district sales office. **L. G. Bygrave** and **J. F. Timmerman** became assistant sales managers.

Frank F. Cambest was appointed assistant general superintendent, Pittsburgh Works, **Jones & Laughlin Steel Corp.** He formerly was superintendent, blooming and rolling mills of the works. **Dave Merrill** was named manager of pail sales for J & L Steel Barrel Co.'s recently acquired steel pail producing facilities of American Can Co.

—o—

R. M. Junker was appointed manager, industrial roll sales department, **Goodyear Tire & Rubber Co.,** Akron.

—o—

Standard Duplicating Machines Corp., Everett, Mass., elected **Alan E. Bruce** vice president in charge of sales.

—o—

Columbia Steel Co., San Francisco subsidiary, U. S. Steel Corp., announces personnel changes in connection with a reorganization of its metallurgical division. **Robert B. Freeman,** named chief metallurgical engineer, continues in charge of the division; **G. L. von Planck** continues as metallurgical consultant, and also handles alloy, stainless and tubular products; **W. B. Kennedy,** named senior service metallurgist, central sales division, is assisted by **J. M. Carrera. C. H. Fitzwilson Jr.,** formerly attached to the tin plate bureau, Carnegie-Illinois, another subsidiary, was appointed metallurgical engineer in charge of flat rolled products; **D. W. Hadsell** was named metallurgical engineer in charge of bar, structural and wire products and **A. H. Danielson,** appointed staff assistant to Mr. Freeman. Metallurgists attached to the southern sales division with offices in Los Angeles are: **R. A. Schaus,** senior service metallurgist; **B. W. Buist** and **J. W. Wunderlich,** service metallurgists.

Peter T. Matzen was appointed works manager, **Hancock Steel Co. Inc.,** Detroit. For the last 24 years he was with Chrysler Corp. as supervisor of by-products activities.

—o—

Neil C. Head was elected a director of **Warren Foundry & Pipe Corp.,** New York.

—o—

Dr. J. Pearson was appointed head of the chemistry department, **British Iron & Steel Research Association,** London, England.

—o—

John M. Mitchell was appointed manager, export division, **Aluminum Co. of America,** Pittsburgh, and **G. B. D. Peterson** was named head of the division's New York office.

—o—

H. F. Lefferty was appointed Pacific Coast sales manager, **Babcock & Wilcox Tube Co.,** Beaver Falls, Pa. His headquarters are in Los Angeles. Associated with the company 33 years, he recently was Chicago district sales manager. He succeeds **H. P. Curtis.**

—o—

Frank R. Freyler was promoted to manager, Mid-Atlantic region, **Allis-Chalmers Mfg. Co.,** Milwaukee, succeeding **William Arthur,** retired. **Arthur D. Brown** succeeds Mr. Freyler as manager, Philadelphia district office. **R. N. Landreth,** with the Washington office, is the new manager there, succeeding Mr. Brown.

—o—

David C. Marble was appointed administrative assistant on range marketing policies, **Hotpoint Inc.,** Chicago, enabling **Don J. Irvine,** staff assistant formerly on ranges and electric water heaters, to devote full time to developing sales programs on

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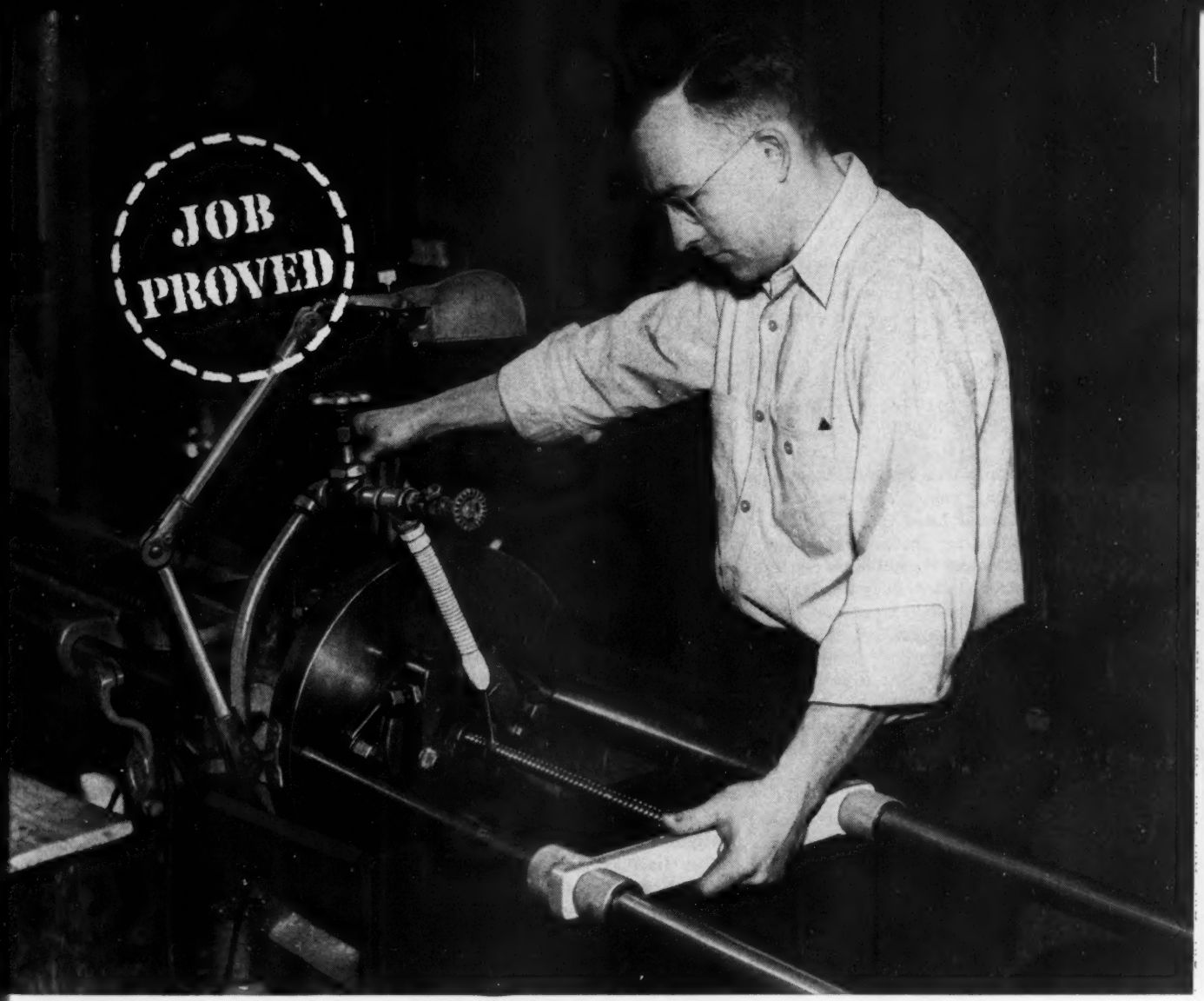

TOOL LIFE INCREASED 25%

Sunicut Improves Broaching Finishes, Operators Like Its Transparency

A plant manufacturing valves was using an expensive straight animal oil for broaching. They were also adding large amounts of this product to the cutting oil used in most other machining jobs. Naturally, cutting oil costs were high.

On the advice of a Sun Engineer who had been called in, the company tried Sunicut. Good finishes resulted in all operations, completely eliminating the need for straight animal oil. Tool life increased 25 percent. Operators liked Sunicut for its transparency—it kept work visible all the time. The plant has been using Sunicut for 14 years with complete satisfaction. Two years ago, the company switched to Sunicut with Petrofac, and since then results have been even better.

Wherever operations involve tough cutting, tapping, or threading, the new grades of "Job Proved" Sunicut with Petrofac will give smooth, accurate finishes. The new grades of Sunicut possess superior metal-wetting, antiweld, and extreme pressure characteristics. They do not contain any animal or vegetable fatty oils—therefore cannot turn rancid.

For information about either Sunicut or the famous Sunoco Emulsifying Cutting Oil, call or write your nearest Sun Office.

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SUN PETROLEUM PRODUCTS

"JOB PROVED" IN EVERY INDUSTRY

SUNOCO®

water heaters. **John G. Praetz** succeeds Mr. Marble as manager, product service division.

—o—

Aeroquip Corp., Jackson, Mich., appointed **Byron E. Snow** sales engineer in the Chicago territory which embraces Illinois, Iowa and southeastern Wisconsin. He will service manufacturing accounts, and has headquarters in Lombard, Ill.

—o—

J. George Piccoli was appointed director of industrial relations, **Associated Industries of Cleveland.**

—o—

Eric G. Orling was appointed manager, pigment sales, Cleveland branch, **National Lead Co. R. B. Gilbert** continues as trade sales manager, and **Thomas B. Williams** as assistant trade sales manager. **D. R. Finn** was appointed treasurer and **Robert Fabry** comptroller, Baker Castor Oil Co., subsidiary, and **Carlton H. Rose** joined National Lead's Washington office, and, in addition, will carry on from Washington his duties as head of the company's specifications department.

—o—

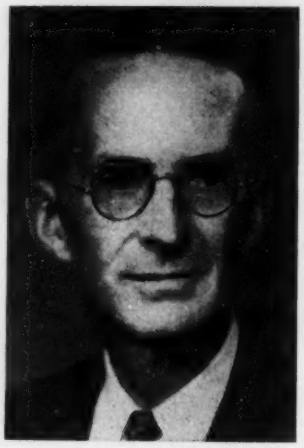
W. M. Hurley, former assistant works manager, was appointed works manager, East Alton, Ill., plant, **Olin Industries Inc.**

—o—

R. E. Byrd, sales engineer, **Atlantic Steel Co.,** Atlanta, was elected president, **American Hot Dip Galvanizers Association.**

—o—

William B. McFerrin was appointed division executive vice president, and **Robert M. Briney** division vice president in charge of wrought alloy products, Haynes Stellite Division, **Union Carbide & Carbon Corp.,** Kokomo, Ind. Both were associated with other metallurgical activities of Union Carbide.



WALTER A. FRAZEE

AUBREY H. MILNES

Steel Improvement & Forge Co., Cleveland, promoted **Walter A. Frazee** to senior vice president, and **Aubrey H. Milnes** to vice president in charge of engineering and sales. Mr. Frazee is responsible for all manufacturing operations, as well as directing purchases and correlating plant production with customer requirements. Mr. Milnes, former chief engineer, is now also in charge of sales policy.

—o—

Wagner Bros. Inc., Detroit, appointed **H. J. Breithart** district sales manager, buffing and polishing products.

—o—

Arthur W. Emmons was appointed to the newly created post of industrial sales representative, New England area, **Paulsen-Webber Cordage Corp.,** New York.

—o—

Henry B. Ahlers was appointed assistant to **John K. Hodnette,** vice president and general manager, industrial products divisions, **Westinghouse Electric Corp.,** Pittsburgh, and will co-ordinate expense control programs for the divisions. **W. T. Pitzer** was appointed manager, central district manufacturing and repair plant, Homewood, Pa., and is succeeded as manager, Cleveland manufacturing and repair plant, by **V. J. Cozzarin. Henry T. Lowell** was appointed manager of sales, small ac control section, standard control division, Beaver, Pa., and **Lloyd T. Cramer** was named elevator division salesman at San Francisco.

—o—

Eugene W. Beall Jr. was promoted from Savannah, Ga., sales representative to manager of **Southern States Iron Roofing Co.'s** branch in Columbia, S. C. **J. A. Smith** succeeds Mr. Beall in Savannah.

—o—

Pittsburgh Steel Co., Pittsburgh, appointed **W. G. Felton** assistant general traffic manager.

—o—

Livingston B. Keplinger, president, Steel Shipping Container Institute, was elected a director, **Copperweld Steel Co.,** Glassport, Pa.

—o—

Earl E. Kleinert and **David R. Tuttle** have joined the sales force of **Wasmer Bolt & Screw Corp.,** Cleveland. Mr. Kleinert will represent Wasmer in wholesale jobber, automotive jobber and railroad field; Mr. Tuttle in industrial sales field.

—o—

John F. Agerter was appointed superintendent of blast furnaces, Indiana Harbor Works, East Chicago, Ind., **Youngstown Sheet & Tube Co.,** succeeding **Clyde M. Horan,** transferred to Youngstown as superintendent, blast furnaces, Campbell Works.

—o—

Edwin A. Hamala was appointed to the sales executive staff, **Royal Vacuum Cleaner Co.,** Cleveland.

—o—

Reliance Electric & Engineering Co., Cleveland, opened a sales office in Charleston, W. Va., with **William C.**

WILLIAM B. McFERRIN

ROBERT M. BRINEY

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McConnell branch manager. **Jack H. Eichler** joined the Boston office as field sales engineer.

—o—

H. W. Hodges was appointed superintendent, wire mill, Pueblo, Colo., works, **Colorado Fuel & Iron Corp. Harold G. Degitz** was named assistant superintendent.

—o—

Robert E. Cassatt was appointed advertising manager, **Fedders-Quigan Corp.**, Buffalo. He was assistant advertising and sales promotion manager, receiver division, General Electric Co.

—o—

J. E. O'Conner was appointed manager, packing and special product sales department, **Goodyear Tire & Rubber Co.**, Akron, replacing **W. F. Ong**, appointed manager, wringer rolls sales department.

—o—

Dr. Francis C. Frary, director of research, Aluminum Co. of America, Pittsburgh, was awarded the **James Douglas Metallurgical Medal** for 1950 by American Institute of Mining & Metallurgical Engineers.

—o—

Paul T. Wharton, vice president, **Rotary Electric Steel Co.**, Detroit, will retire May 1. He has been with the company in various capacities since 1933, and was elected a vice president in 1947.

—o—

R. K. Ridgeway was appointed to represent **Viscosity Oil Co.**, Chicago, in the sale of its steel mill lubricants in the Pittsburgh district.

—o—

Gilbert Nettleton was appointed director of military relations, **Northrop Aircraft Corp.**, Hawthorne, Calif., and will also act as production test pilot for military aircraft.

HARRY A. DENNIS

HERMAN MERKER

Harry A. Dennis was appointed manager of sales, stainless and alloy steels division, **Graver Tank & Mfg. Co. Inc.**, East Chicago, Ind. He will also continue his present assignment as manager of weldment sales.

—o—

Robert A. Osborn has been appointed district manager of Illinois and Wisconsin areas for **Peninsular Steel Co.**, with headquarters in Chicago.

—o—

John B. Dowling was appointed to the newly created post of market analyst, **Yale & Towne Mfg. Co.**, New York.

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J. Ralph Macon joined **Pennsylvania Salt Mfg. Co.'s** market research division, Philadelphia, to work on market development of new products for the metallurgical industry.

—o—

David S. Meiklejohn was elected a director, **International Cigar Machinery Co.**, New York. He has been treasurer since 1949, and assistant treasurer of American Machine & Foundry Co., parent company.

Herman Merker, executive vice president, **Pressed Steel Tank Co.**, Milwaukee, was named president and assumes the duties of the late **H. O. Brumder. W. G. Brumder,** senior vice president, First Wisconsin National Bank, was elected a director.

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F. Carlin Gray has joined the Washington office of **Phelps Dodge Copper Products Corp.**

—o—

C. R. H. Carlson was appointed district manager in charge of Chicago metropolitan area, **Watson-Standard Co.**, Pittsburgh.

—o—

Jacob M. Weidman Jr. will represent the industrial division, **R. M. Hollingshead Corp.**, Camden, N. J., contacting industrial and manufacturing firms in Pennsylvania.

—o—

Taylor & Spotswood Co., northern California distributor for Supergrate & Superweld open steel floor grating, has added **C. W. Tripp** to its engineering staff, grating division.

OBITUARIES...

William J. Hanna, 64, vice president, **Weiss Steel Co. Inc.**, Chicago, died Feb. 21. He joined the steel warehousing firm following retirement three years ago as Chicago district sales manager, Republic Steel Corp.

—o—

Clarence R. DeBow, former manager, **E. I. du Pont de Nemours & Co. Inc.**, Carneys Point, N. J., plant, died Feb. 24. He retired in 1943.

—o—

Frederick Renaud, 74, former owner, **D. J. Renaud & Son Foundry,** Carthage, N. Y., died Feb. 22.

—o—

A. J. Brady, 62, for over 20 years a member of the advertising department, Timken Roller Bearing Co., Canton, O., died in Daytona Beach, Fla., Feb. 20.

—o—

John H. Dougherty, 69, purchasing agent, Buflovak Division, **Blaw-Knox Co.**, Buffalo, died Feb. 22.

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Harry H. Riddle, 76, before retirement associated with the industrial division, **Geo. Worthington Co.**, Cleveland, died Feb. 17.

—o—

Frank A. Hughes, 49, manager of sales engineering department, **Bay State Abrasive Products Co.**, Westboro, Mass., died Feb. 12.

—o—

Henry W. Welsh, 67, general manager, **MacKinnon Structural Steel Co. Ltd.**, Sherbrooke, Que., Canada, and president, Canadian Institute of Steel Construction, died Feb. 19.

—o—

Belden L. Conchar, 60, since 1922 president, **Keystone Stamping Corp.**, Irvington, N. J., died Feb. 21.

—o—

J. E. S. Thorpe, president, **Nantahala Power & Light Co.**, subsidiary, Aluminum Co. of America, Pittsburgh, died Feb. 25 in Franklin, N. C.

—o—

Albert A. Dundore, 61, director of purchases, **Haber Co.**, Chicago, died Feb. 20. Associated with the screw machine products company for the last ten years, he had previously been general manager, manufacturing department, Mead Cycle Co.

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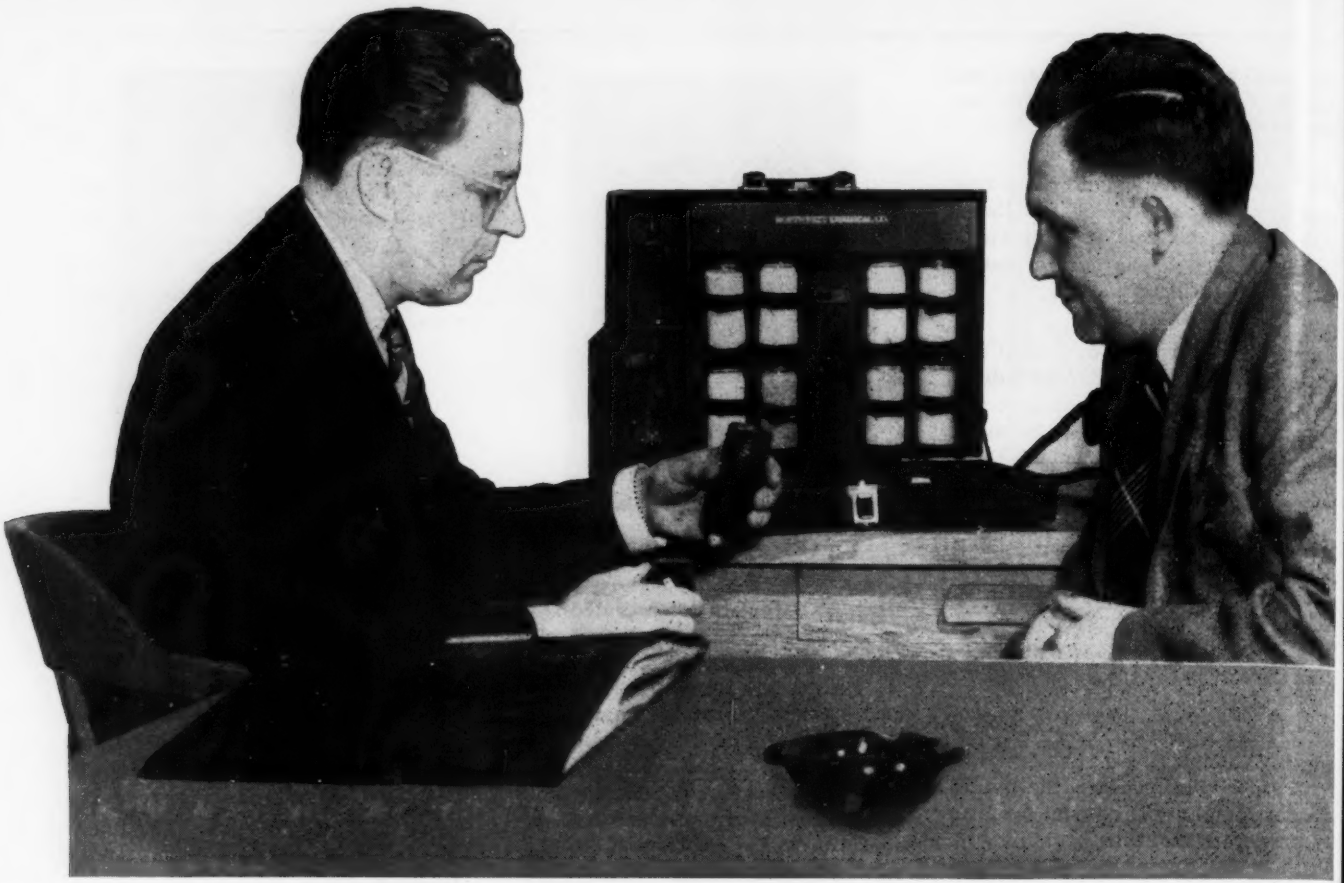

He can SHOW as well as tell you *what he can do for you . . .*

Because NORTHWEST products have a distinctive appearance, our men have always carried samples. Now they are equipped with a case in which products in general use are carried together with equipment for their control. There are liquids and powders—some for use individually, others in combination to get the correct pH for the type of soil to be removed . . . NORTHWEST men are thoroughly experienced in all phases of cleaning and surface preparation. They make the correct recommendation as to which product or products to use—handle their installation and set up their control . . . Ask the NORTHWEST man to SHOW you as well as tell you what he can do for you . . . .

Production AND Engineering
NEWS AT A GLANCE

WIRE ROPES TAME BIG HANDLING JOB—Three-quarter-inch steel cables pulled by four stationary engines each exerting a horizontal pull of 35 tons were employed in rolling a 180-foot steel bridge weighing 1480 tons 33 feet sidewise at Iselin, N. J. The operation which rail officials believe to be the largest railroad bridge ever to be eased into place in such fashion was undertaken to support two of the four tracks of the Pennsylvania Railroad's main line from New York to Philadelphia and Washington. Job was done to eliminate a crossing on New Jersey's route 4 parkway project.

REMOTE MEASUREMENTS—Dimensions that can be seen and not touched are measured by a new device announced by Quality Control Co., Los Angeles. Combining features of a telescope with those of a microscope the unit can be attached to any 18 or 24-inch height gage to make a universal shop inspection instrument. Its dashed-line cross hair will distinguish 0.001-inch at 2 feet, and has a concentric circle for picking up hole centers. With the height gage mounted horizontally, instrument serves as a useful toolroom microscope. It makes inspection of tapered cylinders, recesses, ordinate stations on templates and cams relatively simple.

CUTS ACCESSORY COSTS—Extra conventional power accessories are eliminated and more flexible system of individual machine operation is provided through use of speed variators for driving tubing machines in the plant of Chardon Rubber Co., Chardon, O. The variators, General Electric's new "package" model of the individual motor-generator set, make possible the wide range of driving speed needed in this case for extruding various types and sizes of rubber needed for mechanical rubber goods. They also minimize space requirements, and may be placed on the floor at any desired distance from the drive motor or operator's position.

METAL WEAR DETECTOR—A machine for measuring wear on metal surfaces developed at the Naval Engineering Experiment Station, Annapolis, Md., has shown itself to be accurate within 0.00005-inch in detecting wear on chromium-plated diesel cylinder liner surfaces. Rather than employing the complete actual cylinder, new device uses only a small strip specimen. Abrasives may be adjusted to wear out a liner in a few minutes if necessary.

NO SIMPLE JOB— Supplying Brookhaven National Laboratory, Associated Universities Inc., with 23,000 feet of high conductivity, soft annealed copper bar to be used as magnet winding for huge atom smasher posed no unusual problem for American Brass Co. Nor was it any special strain to provide the two sizes required—large sections having a 2.182 x 0.750-inch cross section in lengths over 52 feet; small sections with 1.875 x 0.750-inch cross section in lengths over 47 feet. But a bit difficult was the piercing of these long conductors with a tiny hole throughout their entire lengths to carry cooling water. Although tolerances were moderate, specs required the hole to have an area of 0.0941 square inches falling within a ½-inch circle at each section's true center. The required 150,000 pounds of these sections were produced successfully on a 2500-ton extrusion press at the company's Buffalo branch.

SPEEDY ANALYSIS—Use of a vacuum fusion method of determining oxygen in ferrous and nonferrous metals is enabling Westinghouse engineers to correlate oxygen content of metals with their magnetic properties. A skilled operator, it is reported, can analyze about 25 samples during an 8-hour day with the procedure. This means that only about 15 to 20 minutes are spent on each sample, and accuracy of the results does not suffer at the expense of speed. Accurate analyses can be obtained on samples as small as 0.1 gram if oxygen content is greater than 0.01 per cent. (p. 80)

LIGHTING COSTS—As a major factor in selecting lighting equipment, cost invariably enters into the appraisal of a new lighting system. Accuracy of the appraisal depends on the integrity and completeness of the cost analysis, and the intelligent evaluation of intangible factors which may be equally as important to the investor as cost itself. Appraisal on cost alone, it is pointed out, disregards effects on overall operating costs due to possible differences in life expectancy of equipment and differences in quality of lighting results. (p. 84)

MANY USES—Wherever heat is used in an industrial process, chances are you will also find the furnace and the refractory working as a team. In many industries the efficiency, life and capacity of heating equipment are determined by the ability of refractories to perform their allotted jobs. Naturally, to keep pace with technical developments much research was required to bring refractories to present high level quality and broadened service. (p. 86)

STRENGTH EQUALIZED — Ultimate tensile strength and ductility of wrought iron, unlike those properties of steel, are greater in the longitudinal or rolling direction than in the direction transverse to rolling. This difference is due to the nature of the slag distribution. Within the past few years, however, an advanced rolling procedure has made possible an equalization of the normal ultimate strength and ductility in two directions. (p. 92)

How to Determine OXYGEN IN ...by fast vacuum f

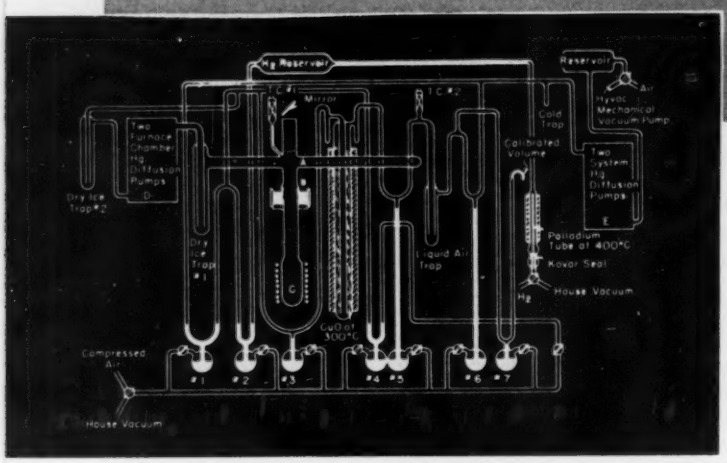

Fig. 1—Schematic representation of vacuum fusion apparatus shown in Fig. 2

Capable of analyzing samples weighing from 0.1-gram to 2 grams in 15 to 20 minutes with an accuracy of about plus or minus 0.001 per cent, procedure described makes possible correlation of oxygen content of ferrous and nonferrous metals with magnetic properties

FAST determination of oxygen in ferrous and nonferrous metals by the vacuum fusion method is enabling Westinghouse engineers to correlate oxygen content of metals with their magnetic properties. Deoxidation procedures and the effectiveness of vacuum melting are also being studied. Method enables a skilled operator to analyze about 25 samples per 8-hour day, i.e., 15 to 20 minutes per sample. Accuracy of the results has not suffered at the expense of speed.

On some apparatuses hydrogen and nitrogen can also be determined. But our primary interest has been in magnetic quality of materials and, while hydrogen and nitrogen do affect magnetic properties adversely, they can be readily eliminated by proper heat treatment. Thus this apparatus is designed for the determination of oxygen alone, although it can be readily modified for the determination of hydrogen and, with the addition of a Toepler pump, for the determination of nitrogen.

Apparatus—Principle of the vacuum fusion method is to reduce the FeO or combined oxides in the metal samples by melting them in a graphite crucible in an evacuated system. The carbon monoxide gas evolved, due to the reaction of carbon and oxide, is passed over hot copper oxide which oxidizes it to carbon dioxide. It is then possible, by cooling a part of the system with liquid nitrogen, to collect all the carbon dioxide and then to remove other gases such as nitrogen by vacuum pumps. Subsequently, the carbon dioxide is expanded and measured volumetrically in a small calibrated volume.* The amount of oxygen given up by the sample can then readily be calculated.

Fig. 2 is a photograph of the vacuum fusion apparatus; Fig. 1 is a schematic representation. The straight glass side arm (A) holds the samples which are placed in it through the 1-inch ID ground glass joint at B. They can then be moved about by a magnet and dropped into the crucible (placed inside C) for analysis. With two small horseshoe magnets one soon becomes adept at separating samples that are touching, or at lifting a certain sample to the top of the tube with one magnet and moving it over the other samples which are held in place by the proper movement of the other magnet. In this way any of the 25 or more samples may be analyzed at any time, regardless of the order of loading. Nonmagnetic samples can be pushed around with a small magnetic rod. A straight tube 16 inches long will hold a sufficient number of samples for a day's run.

The only ground glass joint (B) of the all-glass apparatus is equipped with a mercury seal. The seal consists simply of a heavy rubber ring slipped over the furnace tube and a short section of glass tubing squeezed onto the ring. No lubricant is necessary on the joint and no diffusion of mercury into the system has been detected; this has also been the experience of another investigator[6].

Furnace tube (C) is of thin-walled transparent quartz made by Thermal Syndicate Co. It is 21 inches long, a little over 1 inch ID and the 6-inch expanded end a little under 2 inches in diameter.

Crucible Assembly—The graphite crucible assembly

* Four calibrated volumes are used, depending on the oxygen content of the sample. For volume No. 1, 1 mm of Hg of carbon dioxide corresponds to 0.0001 per cent oxygen on a 1-gram sample; for volume No. 2, 1 mm corresponds to 0.0002 per cent; for volume No. 3, it corresponds to 0.001 per cent; and for volume No. 4 it corresponds to 0.002 per cent.

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N METALS

um fusion method

By R. K. McGEARY, J. K. STANLEY and T. D. YENSEN
Research Laboratories
Westinghouse Electric Corp.
East Pittsburgh, Pa.

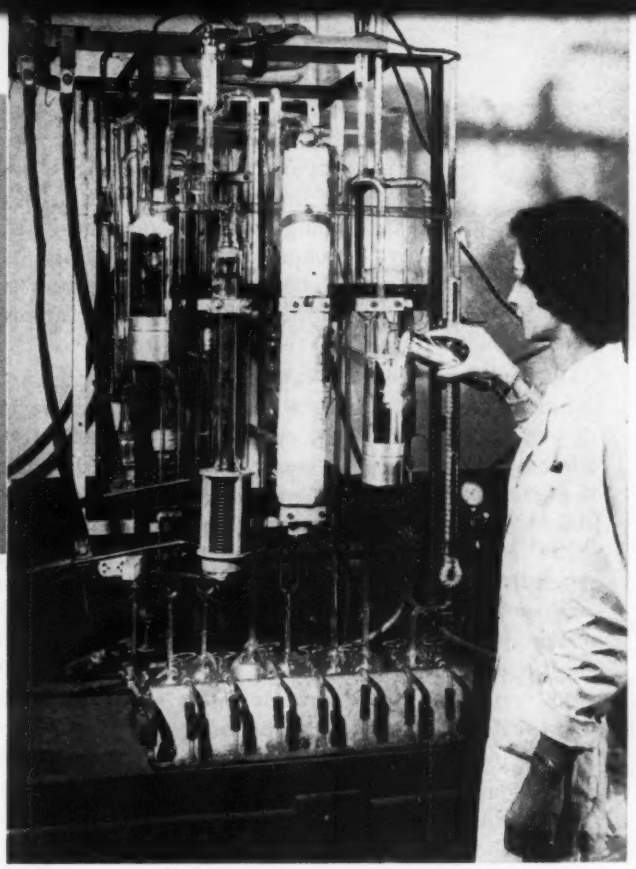


Fig. 2—Photograph of vacuum fusion apparatus

is placed in the quartz tube but only the top of the graphite guide tube which is at a comparatively low temperature touches it. Although the clearance between the split graphite shield and the quartz tube is only about ⅜-inch, it is not necessary to water-cool the tube. The same tube has now been in operation for several years without a sign of devitrification. Although the metal condensation on the large diameter of the quartz tube is small (due to absence of water cooling), the heavier deposit just above the graphite guide tube necessitates the cleaning of the quartz tube after each disassembly. This is effectively accomplished by a rinse in an aqueous solution of hydrofluoric acid.

A very fast all-glass mercury diffusion pump, backed by a glass down-jet diffusion pump (D), rapidly removes the gas given up by the samples from the furnace chamber (C). These pumps have been added only recently when occasional low results were obtained on some samples. It was believed that we were experiencing the universal trouble reported by most users of vacuum fusion equipment, namely, "gettering" of gases by condensed films of the more volatile metals that are present in the samples, or reaction with their vapors. Rapid removal of the gases from the regions where the metal films have formed apparently reduces the amount of gas lost in this manner. Formerly only pumps (E), which are duplicates of (D), were used for the extraction of the gases from the system. Although we have made no study of the gas recovery with samples high in volatile elements, we feel that the increased speed of removal of gas from the furnace chamber is fundamentally important.

Two traps (No. 1 and No. 2, Fig. 1) on either side of the furnace chamber pumps are placed in powdered dry ice to prevent the diffusion of mercury into the rest of the system.

Gas pumped out of the furnace chamber is forced into the analyzing system where the carbon monoxide (which comprises most of the gas) and hydrogen are oxidized by the copper oxide catalyst to carbon dioxide and water. Liquid air (or liquid nitrogen), placed on the liquid air trap, freezes out all of the resultant carbon dioxide and water. By raising certain mercury cutoffs, placing liquid air on the calibrated volume and heating the carbon dioxide in the liquid air trap, the carbon dioxide can be transferred to the calibrated volume. Finally the pressure exerted by the expanded gas in the calibrated volume is read and the oxygen content calculated.

Method of Operation—The apparatus described is capable of analyzing very small samples. Generally the samples are between 0.5 and 1.0 gram, although accurate analyses can be obtained on samples as small as 0.1 gram if the oxygen content is greater than 0.01 per cent; samples smaller than 0.1 gram can be used if the oxygen content is high. This introduces a versatility to the vacuum fusion method which is particularly useful in situations where only a certain small portion of a material will yield the desired information. There is of course a serious disadvantage to small samples when dealing with heterogeneous material; in such cases a greater number of larger (at least 2-gram) samples should be used.

It is sometimes possible to prepare spheroidal samples so that the surface area and hence the surface oxide film is close to a minimum. It has been found that by lightly etching samples in a solution of nitric acid, acetic acid and alcohol, surface defects can be detected and the defect or the sample can be eliminated. Imperfect samples in many cases are not discernible when merely ground or abraded. We have

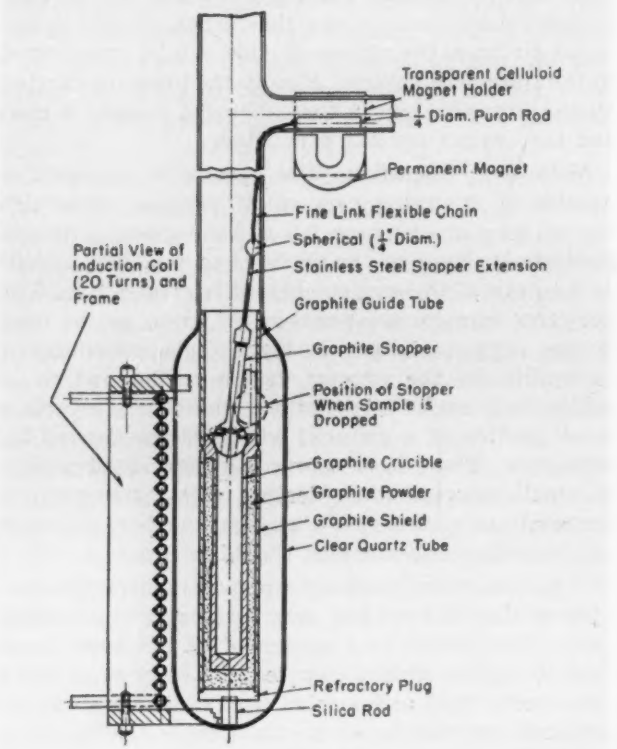
From data presented before the 31st annual convention, American Society for Metals, Cleveland, Oct. 15 to 21, 1949.

found no increase in oxygen results due to the etching. Surface area of the samples as normally prepared is so small in comparison to their weight that the small increase that might be expected in surface oxygen due to etching remains undetected. An effort should always be made to introduce the samples into the apparatus and to evacuate it as soon as possible after etching as the etched surfaces of many iron alloys tend to rust readily.

Outgassing—After the introduction of samples into the side arm, the system is evacuated by turning on all pumps with all of the cutoffs lowered. After the vacuum has reached a steady state (about 10^{-3}mm of Hg), Nos. 2 and 4 cutoffs are raised, the power turned on and the crucible heated to 2200° C (3990° F) or higher for 2 hours. Since this operation generally takes place at the end of the day after the samples are loaded, the power is shut off and the system is isolated by raising cutoffs Nos. 1 and 5. The next morning the system is again outgassed 15 to 30 minutes before lowering the temperature to about 1650° C (3000° F). The samples are then analyzed.

Procedure for Analysis—To make the sample analysis, cutoff No. 1 is closed and Nos. 5, 6 and 7 are open. When the system was first evacuated cutoffs Nos. 2 and 4 were closed and No. 3 was open; these three cutoffs are never changed again until all the samples have been analyzed. Fig. 2 shows the correct position of the cutoffs for the beginning of a sample analysis. Liquid nitrogen (or liquid air) is placed on the liquid air trap and the power is then shut off

Fig. 3—Diagram of crucible assembly



and the crucible allowed to cool about 100 to 200° C, whereupon the sample from (A) is dropped into the crucible in (C). The gases from the melted sample are pumped out of the furnace chamber into the analyzing system by the pumps (D). After the first burst of gas the power is again turned on. Power is generally off less than 1½ minutes and the resultant slower melting of the sample and slower evolution of gas at the reduced temperature greatly decreases the amount of spattering of molten metal.

Diffusion pumps (E) then move the gases through the catalyst, oxidizing the CO to CO_2 and H_2 to H_2O which are then frozen out in the liquid air trap. The nitrogen and possibly other gases are continuously pumped out of the system. When all the oxygen and hydrogen has been evolved and collected as indicated by the rise of the two vacuum gages (TC No. 1 and TC No. 2) to their original readings, cutoffs Nos. 5 and 6 are raised, thus isolating the liquid air trap and calibrated volume. Cutoff No. 1 is lowered, thus opening the furnace chamber to the pumps (D) and (E). Liquid air is removed from the trap and placed on the calibrated volume.

Trap is warmed with a bunsen burner, causing the carbon dioxide to be evaporated and recondensed in the calibrated volume. When TC No. 2 indicates that this transfer is complete, cutoff No. 7 is raised and the carbon dioxide is expanded by removing the liquid air and warming the glass with the hand to just below the temperature at which the frozen water is expanded, although for most samples the amount of water vapor is negligible. After the difference in height of the mercury levels is read, the gas is evacuated by raising cutoff No. 1 and lowering Nos. 6 and 7. Then No. 5 is lowered and the system is ready for the next sample.

Time—Depending on the type of oxide and oxygen content, the time to make an analysis is approximately as follows:

Operation	Time, Minutes
Evacuation after previous sample	2 to 4
Collection of CO_2 being evolved	7 to 10
Expansion, recollection, re-expansion, and measurement of CO_2	4 to 7
Total time	13 to 21

Up to about 28 samples can be analyzed in one day in the same crucible. The crucible is never reheated the next day to analyze samples left from the previous day, since this has produced unsatisfactory results.

Blanks—A certain amount of gas is given off continuously from the system so that a blank correction must be subtracted from the total gas collected from a sample. Only blanks after the first sample is dropped are significant; blanks with metal in the crucible are slightly higher than empty crucible blanks.

If one has a rough idea of the oxygen content of the samples, their weights can be chosen so that the variations in the blank produce negligible effects on the results. If this is not practical the gradual change of the blank can be closely followed by taking a blank every few samples. Blanks are made the same way as a sample analysis except for dropping of a sample into the crucible. (*Please turn to Page 118*)

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SEEN AND HEARD IN THE Machinery Field

By GUY HUBBARD
Machine Tool Editor

DEFEAT OF SAFETY DEVICES: Throughout industrial history, progress has been spurred on by rivalries between "ways-and-means". In some cases these have been rivalries between good things—as for example in the constant race between machine tools and tooling. In other cases they have been rivalries between good and evil. An example of this is the constant "war" being waged between designers of safety devices and those whose misguided ingenuity is devoted to the "nullification" of these same safety devices.

The strange thing about this war is that those who exhibit such perverse ingenuity in nullifying safety devices, are the operators for whose benefit the safety devices have been designed and installed. This peculiar form of flirting with fate is all too common in the metalworking industries in connection with machine tools and with presses and related machinery.

That was driven home to me recently when I was visiting a large production plant, whose long safety record had just been spoiled by an accident on which the report read something like this: "Operator finally discovered way to tie back automatic safety guard, with result that he lost tips of three fingers."

Various reasons can be assigned to the constant efforts of some operators to get around the ingenuity of safety engineers. Some of them do it just because they like to break rules. The best way to handle them is to get rid of them. No penalties ever are effective with people like that. Others do it out of pure bravado. Some of them grow up after they have lost a finger—others have been known to be so "dumb" as to lose another finger demonstrating how they lost the first one.

Some operators resent being "pushed around" by a piece of machinery. There is something so coldly impersonal about a device which pushes or yanks one's hands out of the way of tools. They are the same "rugged individualists" who resent the policeman who yanks them out of the path of a car when they are jaywalking. Still others—piece workers in particular—resent guards and other safety devices which they imagine slows down their output.

It is one thing to design efficient safety devices, but it is quite another thing to design efficient safety devices which can cope with human nature. It may be that the answer lies in transferring some of the most ingenious "defeaters" of safety devices to the safety engineering staff as official and final testers of new protective devices. Long ago a manufacturer of safes and bank vaults employed a reformed "cracksman" in a similar capacity. He taught the locksmiths things about their own work that they never before had realized or understood.

ELIMINATING "SECONDARY OPERATIONS": The pendulum marking industrial development swings so slowly that unless we trace its path over periods of years, we fail to realize that it is a two-way swing. In its swings it frequently brings out of the past things which seem to be entirely of the present.

An example is the current tendency to perform in automatic bar and chucking machines ingenious supplementary operations which formerly were "secondary" operations. The philosophy behind this is that of the old machine shop slogans: "Once you chuck a part, don't let go of it until every possible operation has been performed on it."

With the tremendous increase in cost of human work, such elimination of "rehandling" now is tremendously important from an economic point of view. It was in the old days more a matter of operating convenience.

That accounts for widespread revival—after 30 years of more or less neglect—of such techniques as cross-drilling, slotting, milling and cutting of worm threads in automatics. If you haven't explored the possibilities of these things lately, I advise that you do so—especially if your work is highly competitive.

Basic principles of these operations were worked out many years ago, but usually they materialized in the way of "trick setups" rather than as well recognized tool engineering. Usually the so-called "attachments" were flimsy and tools inadequate.

With advances in the art of packing sturdy mechanism into small spaces, applying unit electric drives, and with the advent of carbide tooling, the nature of these devices and their possibilities have changed completely. Speed of the machine does not have to be slowed—they can keep pace with the conventional "straight tooling". Many of them no longer are in the nature of attachments. Rather they are built-in, or provisions are made for their rigid installation.

This is one of the significant steps in the industrial trend broadly covered by the recently coined word "automation"—which really means about what the old machine shop slogan already quoted, says.

OPTICAL ILLUSIONS: Belief that the blind can "feel" things which those with good eyesight fail to see, is proved by impersonal findings of "profile exploring" instruments on metal surfaces.

Some which appear to the eye as being the acme of perfection, turn out to have low "IQ" as expressed in "microinches". Others which give the illusion of poor quality because of swirls and dullness which affect their light-reflecting ability, give a fine account of themselves when explored by profile-measuring instruments.

Relation between these surfaces is something like that between the insides of cases of old-fashioned pocket watches. Some were "parallel polished" to mirror finish. Others were ornamented by a pattern of "whirls" produced by polishing with a "pencil buff". The same extremely fine abrasive produced both surfaces, which were identical except for the "lay of the grain".

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Better Lighting Conditions

CAN CUT COSTS THROUGH IMPROVED PLANT PERFORMANCE

In the search for every possible means of reducing production costs management cannot afford to overlook well-planned selection and maintenance of lighting equipment. Here the author points out some of the ways seeing tasks can be lightened

By R. M. SMART
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SEEING is an all-important process in every day living since it affects almost everything we do. The seeing process depends on the seeing task, on ability to see and on light. Beyond rather limited improvements, the seeing task cannot be changed to permit its being seen to better advantage. Similarly, improvements in ability to see are limited to proper eye care and to the correction of eye defects. Fortunately, however, light can be varied and controlled at will to improve the seeing process.

This improvement is brought about by the effect of light (or lighting) on the many factors that influence the seeing process, such as time required to see, apparent size of objects, their apparent speed and contrast both within and outside of the seeing task. It is the effect of lighting on these factors that governs the speed and accuracy of seeing, and the degree of comfort and ease of seeing, which are so important from the standpoints of quantity and quality of work performed, employee morale and well-being and accident prevention in industrial operation.

In general, as quantity of light is increased, less time is required for seeing, small objects appear larger, speed of moving objects appears to decrease and greater contrast results. For many years, quantity of light, often referred to as illumination level or illumination intensity, was the primary consideration in judging a lighting system. The higher the intensity, the better the lighting system. This method of judging lighting was acceptable for many years but as minimum lighting levels were raised through increased knowledge of the science of illumination and, as higher levels became more economical to use, a serious problem was introduced.

A comparatively recent concept of lighting, known as lighting quality, is the property of lighting which deals with effective light from light sources or lighted objects and which is dependent upon light source characteristics and surface reflectivities. Quantity, on the other hand, assumes a source of light and is the property of lighting dealing with light incident upon, or received by, a surface regardless of surface reflectivity.

Selection of Lighting Equipment • • Adequate consideration and proper weighing of the factors which influence the selection of lighting equipment will produce results which are not materially at variance with the desired goal. These factors consist of a knowledge of the physical characteristics of the area to be lighted and the requirements of the seeing task in quantity and quality of lighting; type of light source to be employed, type of fixture or luminaire most suitable for the application and last, but far from least, cost.

Physical characteristics of the area to be lighted take into account the dimensions of the area, which, of course, govern the number of light sources to be employed to obtain the required intensity and light distribution. They also take into consideration the type of visual task to be performed and the quantity and quality of lighting required for the task. Colors of ceiling, walls and equipment are important characteristics since they affect the selection of light source and from the standpoint of reflectivities, they are a controlling factor of lighting quality.

Although a lighting system often can be designed for an existing color scheme, it is far more desirable and sometimes less costly to plan the color scheme with the lighting system, thus reducing the limitations on the selection of equipment, and the necessity for compromises on quality that adversely affect the desired results. Other characteristics which require consideration are the prevalence of dust and dirt in the atmosphere, interferences such as ducts, partitions, cranes, etc., that may limit the mounting of lighting equipment, the characteristics of the electrical distribution system that may affect the selection of light source and the lighting equipment, and structural or time limitations that limit equipment selection and affect maintenance.

Light Source • • Selection of light source influences the selection of lighting equipment in more respects than equipment design, since it has a bearing on those characteristics of the area involving color, lighting quality and maintenance of illumination level.

and affects cost in several respects. Of the types of source available, the incandescent lamp, mercury vapor lamp and fluorescent lamp are the three most generally employed. Lamps of all three types are available in a variety of sizes to meet specific application requirements. Each type has advantages and disadvantages not common to either or both of the others and, for this reason at least, it is unlikely that any one of them will supplant the others to any large degree.

The incandescent lamp is available in the largest variety of standard sizes, shapes and finishes of any of the types of source. Many of the sizes are interchangeable in the same equipment, giving it an advantage of flexibility. Interchangeability may also be a disadvantage, however, because many types of equipment will accommodate lamps of sizes larger or smaller than those for which it was designed, resulting in reduction in overall lighting efficiency and inferior lighting quality. Being essentially a concentrated source, it lends itself well to optical control, permitting a wide selection of light distribution patterns both within the lamp itself, as exemplified by the various reflector lamps, and in connection with suitable equipment. Its concentration may also become a disadvantage because of inherently high brightness which may not be shielded adequately.

Though the light from the incandescent lamp is predominantly yellow the color is generally acceptable for most applications. Relatively short life, low efficiency and excessive heat radiation are unfavorable characteristics of the incandescent lamp compared with other sources. It is quite sensitive to voltage variations, a slight change in voltage resulting in a correspondingly greater change in light output, wattage and lamp life. Since it is relatively small in physical size and requires no auxiliary equipment for its operation, equipment designs are relatively simple, small and low in cost.

It is widely used for general and localized lighting systems, in combination with mercury vapor lamps, primarily for color correction, and to provide high intensity supplementary illumination. The type with the built-in reflector is extensively used for general lighting where the maintenance problem is difficult from the standpoint of accessibility of reflectors for cleaning or from that of very rapid accumulation of dust and dirt, and are widely used for supplementing the general lighting.

Mercury Vapor Lamps • • In mercury vapor lamps, the high pressure of type H mercury vapor is most generally used, the low pressure Cooper-Hewitt lamp having given way almost entirely to fluorescent lamps. Like the incandescent lamp, it is relatively small in physical dimensions and is a comparatively concentrated light source. Since its radiation is predominantly blue-green its application is primarily in industrial or outdoor lighting where it frequently is supplemented by incandescent equipment for color correction. Being an electric discharge source, it requires auxiliary equipment for its operation. It is available in comparatively few sizes the most popular of which is the 400-w lamp.

With its auxiliary, the 400-w lamp has an efficiency about twice that of the 300-w incandescent lamp and has three to five times the incandescent lamp life, depending on frequency of starting. When supplemented with incandescent lamps the overall efficiency is lower and maintenance becomes more of a problem due to the difference in life between these two types of lamp. While more rugged than the incandescent lamp, it requires several minutes to attain full light output and requires a cooling period of several minutes before it will start again after a circuit interruption.

Fluorescent Lamp • • The fluorescent lamp, unlike the incandescent and high pressure mercury lamp, is a long slender source that emits light uniformly from its entire surface rather than from a relatively small area. Being fundamentally an electric discharge source it requires auxiliary equipment for its operation. Since its light output is the result of transformation of invisible radiation by means of chemical salts coated on the inside of the glass tube, many color variations are possible through the use of different blends of salts. There are two general types of fluorescent lamps known as hot cathode and cold cathode. Except for the hot spot the hot cathode electrode operates at a much lower temperature, but the watts dissipated by the cold cathode electrodes are much greater, thus making the cold cathode lamp hotter over the cathode area during operation.

Cold cathode lamps have inherent limitations of light output and efficiency which generally restrict their application to outdoor lighting and special interior designs requiring custom-made lengths and shapes fabricated by local sign manufacturers. Although they also are available in standard sizes, their use is relatively limited and recent developments in hot cathode lamps probably will restrict their application still further. The cold cathode lamp can be flashed repeatedly without serious reduction in life; its light output can be varied with dimming equipment, and its life is slightly greater than that of the hot cathode lamp. However, since its lumen maintenance late in life is comparatively poor the longer life is of little advantage and, since the other advantages are of questionable value in most applications, the disadvantages of the cold cathode lamp usually throw the balance in favor of the hot cathode type.

Hot cathode lamps are those to which the terms "fluorescent lamp" and "slimline lamp" invariably apply. They are available in lengths from 6 to 96 inches, in diameters from $\frac{5}{8}$ to $2\frac{1}{8}$-inches and in wattages from 4 to 100. Their average life is 7500 hours for those using starters and 4000 hours for instant starting lamps. In the sizes most commonly used their efficiency is the highest yet attained from a practical, commercially available light source. They are available in whites which range from the color of light from the incandescent lamp to the bluish white hue of the daylight color, to suit the application and individual color preference. They can be obtained with excellent color constancy both throughout lamp life and from one lamp to another of the same color rating. (*Please turn to Page* 102)

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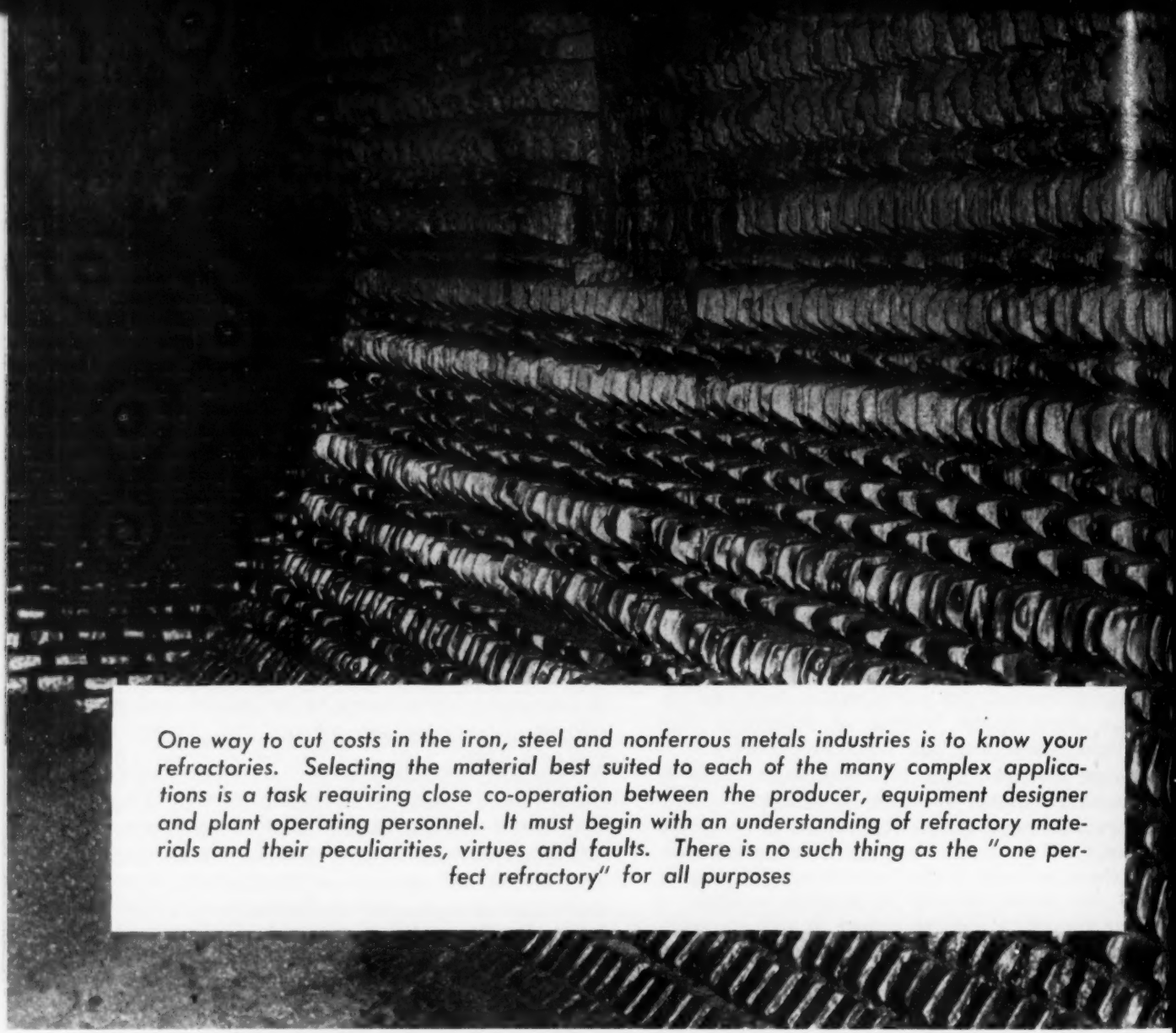

One way to cut costs in the iron, steel and nonferrous metals industries is to know your refractories. Selecting the material best suited to each of the many complex applications is a task reauiring close co-operation between the producer, equipment designer and plant operating personnel. It must begin with an understanding of refractory materials and their peculiarities, virtues and faults. There is no such thing as the "one perfect refractory" for all purposes

Fig. 1—Appearance of fireclay brick after long period of exposure to a slag high in iron oxide

PART I

BROADLY speaking, a refractory is a material resistant to fusion (state of fluidity or flowing of a substance due to heat) or other effects of high temperatures. Actually all materials are refractory in varying degrees, but only a few are sufficiently resistant and low enough in cost to be used as commercial refractories. Therefore, our industry thinks of a refractory as a nonmetallic substance which resists high temperature and is suitable for furnace use in the presence of other destructive forces, such as rapid temperature changes, attack by various chemicals, heavy stresses under load at high temperatures, abrasion and physical abuse. Commercial refractories, with few exceptions, are oxides or combinations of oxides of chemical elements, but in a general sense any material that can be heated slowly to 1500° C (2732° F) without showing obvious signs of fusion may be classified as a refractory.

Where Used—Wherever heat is used in an industrial process, whatever the industry or application of heat may be—there you will find the furnace and the refractory working as a team. Prime function of refractories is to provide linings for furnaces which smelt ores, melt, refine or reheat metals, calcine and fuse or "sinter" oxides, or generate fuel gases or steam. In order to do this, they must resist high temperatures, slag corrosion and abrasive action of the charge while retaining their size and shape. They must absorb a portion of heat released by the heat source, and then transmit most of the remainder back to the charge—thus keeping most of the heat, and any molten substances formed by the heat, inside the furnace.

Early refractories were natural sand and clay. Then came pudding stone, granite, sandstone, dinas and siliceous rock, roughly hewn and bonded with refractory mortar. But as industry grew more complex, additional demands presented themselves. Present-day refractories must not only be temperature-resistant in ever higher ranges, but must withstand slagging (chemical action), abrasion (physical wear) and spalling (breaking away in pieces), as well as other

Refractories

. . . Types, Properties and Service Behavior

By R. P. HEUER and C. E. GRIGSBY
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Philadelphia

stresses and physical phenomena induced by heat. Construction and service requirements have inspired a wide variety of shapes and sizes of brick, in addition to mortars, plastic refractories, ramming mixes, castable refractories and insulating materials.

In many industries the efficiency, life and capacity of equipment are determined by the ability of refractories to perform their allotted jobs. This has stimulated technical development of refractories to the present high level of quality and broadened service. Constant research is being conducted to further improve refractories. Chief taskmaster is the gigantic iron and steel industry which accounts for approximately 63 per cent of all refractories consumed. Public utilities and power stations account for about 14 per cent. Nonferrous metals industries consume about 6 per cent, ceramic industries 9 per cent, chemical process industries 4 per cent, and miscellaneous 3 per cent.

Forms of Refractories—Almost all refractory materials are available as brick in a wide range of standard sizes and shapes, or as special shapes or blocks. Most are also available as mortars for forming joints between the brick, or for patching or coating the brickwork. The mortars generally have properties similar to brick made from the same materials, and may be supplied in dry powdered form requiring mixture with water before use, or in a wet, ready-mixed form for immediate use. They are available with air-setting or heat-setting properties.

Plastic refractories are made from most types of refractory materials and are desirable for forming special shapes and for low-pressure ramming or working into solid monolithic sections (without joints). Ramming mixes for high-pressure forming of either shapes or monolithic sections are available in most types of refractory materials.

Still another kind of refractory product, called castable, is made to set up hydraulically, like portland cement, and is supplied dry for mixing with water. Monolithic (solid, unjointed) sections can be poured with castable refractories. They are also widely used for forming special shapes on the job, thus avoiding delays or need for carrying large inventories of seldom-used shapes.

Bulk refractories include ground raw fireclay, calcined fireclays, ground ganister, ground firebrick, chrome ore and magnesite and dead burned dolomite in various grain sizes, and other such items.

Some insulating materials, notably insulating firebrick, must also be considered as refractories. They are characterized by high porosity and are used to reduce heat stored in, and heat loss through, furnace linings.

What Causes Destruction of Refractories—Value of a refractory depends upon its ability to retain its original size and shape under furnace conditions. Various destructive forces cause it to deform or wear away, reducing the lining thickness until eventually the furnace can no longer be operated. Useful work done by the lining between the time it is first put into use and the time it must be removed is called "service."

Refractories may be reduced in volume or changed in shape by fusion, load, fluxing, peeling, spalling, disintegration, abrasion, loss of strength, and vaporization—either singly or in various combinations with each other. It is unusual to find any one of these factors acting alone. Generally, combinations of destructive forces will wear the refractory more rapidly than any one of the single forces. Nevertheless, the refractory most resistant to the principal destructive force is usually the one most resistant to loss of volume from all causes, and the one which normally gives best service.

Fusion is a state of fluidity or flowing as a result of being heated. It is rare in refractory service and usually unnecessary because there are refractories for

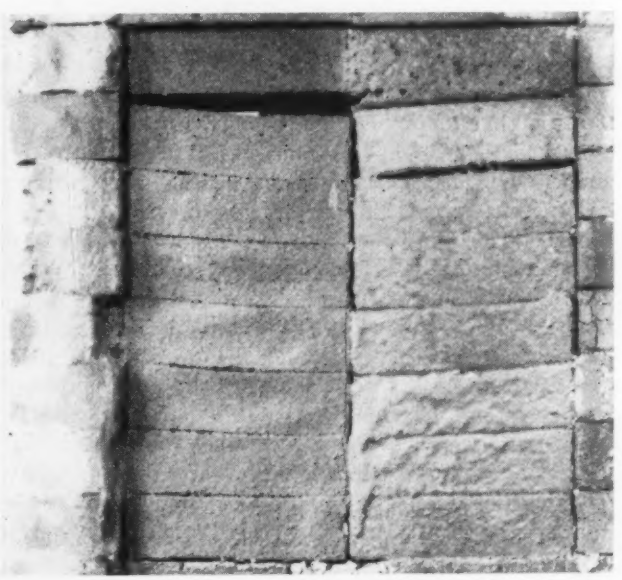

Fig. 2—Fireclay brick heated to point of softening and fusion. All photos courtesy General Refractories Co.

Refractories

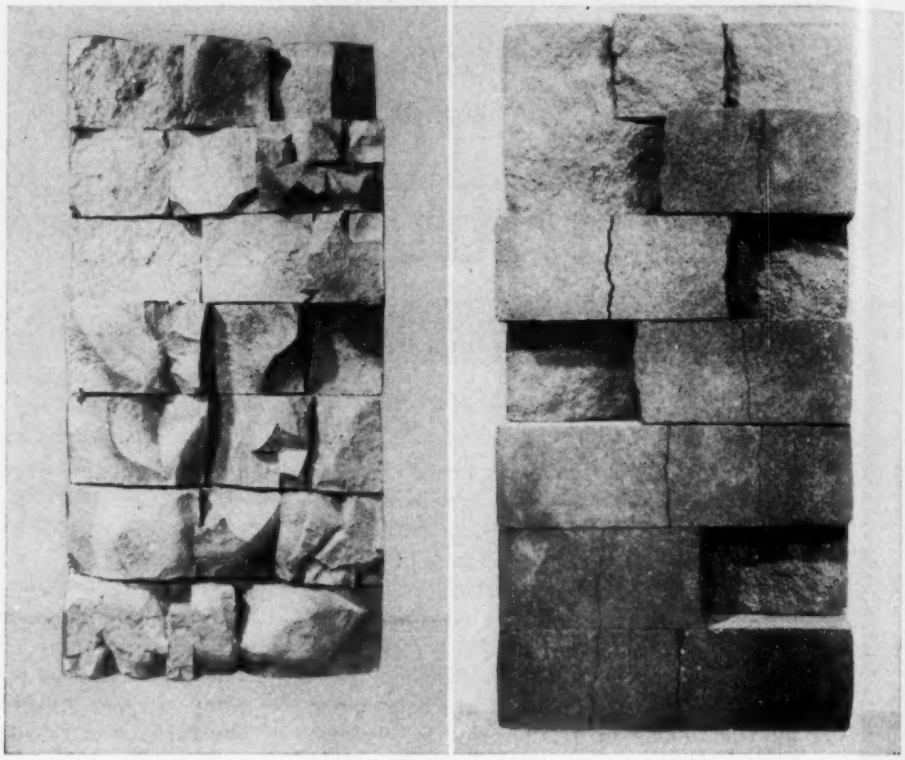

Fig. 3—Left photo shows appearance of fireclay brick after spalling in ASTM panel spalling test. On right is shown spalling produced in brick of high thermal expansion and high modulus of elasticity by thermal shock only

the usual heat in any commercial furnace. Fusion is very often wrongly blamed for the effects of slag corrosion.

Load, or pressure from weight above, rarely causes uncontaminated refractories to fail—except in some center walls which are entirely surrounded by heat. A brick with proper bond and a higher degree of crystallinity, or higher fusion point, or both, can usually withstand such furnace loading without excessive deformation.

In many furnaces refractory surfaces are in contact with certain substances which may react with the refractory to form a liquid mixture that drains away some of the refractory, thus reducing its volume and shortening its service life. These substances, broadly termed fluxes, include iron oxide, lime, copper oxide, lead oxide and alkalies. They cause slag corrosion, one of the most common reasons for loss of volume of furnace linings.

The products formed by the reaction of slags with various refractories may have different melting points. Thus high alumina brick are more refractory in the presence of iron oxide than are high duty fireclay brick. The higher its alumina content, the better a brick resists iron oxide slagging.

Iron oxide does not react readily with chrome or chrome-magnesite brick, yet absorption of the oxide by the brick may cause swelling or "bursting" under certain conditions of temperature and atmosphere. Magnesite, on the other hand, can absorb four times its own weight of iron oxide to form a compound, magnesioferrite ($MgO \cdot Fe_2O_3$) that does not melt below 3180° F.

Phenomenon Of Immiscibility Appears—Lime reacts with silica, fireclay and high alumina refractories to form mixtures that have relatively low melting points. When lime and silica are brought together, the phenomenon of "immiscibility" (inability to be mixed) applies until the lime concentration rises above 28 per cent. We have two immiscible liquids at 3090° F, and the melting point does not fall below 3090° F until the time that concentration of lime exceeds 28 per cent. Thus silica brick resist high lime slags better than do alumina-silica refractories. However, for other reasons, magnesite brick resist lime slags better than either of these two.

Copper oxide forms low melting point mixtures with silica and alumina-silica refractories, high melting point mixtures with chrome and magnesite refractories. Lead oxide reacts readily with silica and less readily with high alumina refractories. Magnesite refractories are least affected by lead oxide.

Increase in the alumina content of an alumina-silica refractory increases its resistance to attack from alkalies. Chrome brick are more resistant to alkalies even though chromates may be formed at red heat.

Peeling, or surface deterioration, is brought about when a flux produces a mixture differing from the refractory itself in specific gravity or thermal expansion, or both, thus forming a layer which will separate from the rest of the refractory as a peel or slab. In this case, the flux mixture does not necessarily have to be liquid at furnace temperature to cause loss of refractory volume. Peeling is often found in checkers of open-hearth furnaces, hot-blast stoves and glass furnaces where alkalies deposited on fireclay or high alumina brick cause formation of a compound. Excessive growth may also occur at the slag line of furnaces melting and refining aluminum, if the refractory contains free silica.

Spalling is a term used to describe the cracking and breaking away or crushing of a refractory unit due to thermal, mechanical or structural causes.

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Sole objective of this group of articles is to help you better utilize the refractories which are a major part of so much of your equipment. In this first article types and forms of available refractories, and their major characteristics and service behavior shall be discussed. In subsequent articles, application of refractories to each major type of furnace or equipment used for smelting, melting, refining or otherwise processing iron, steel and the nonferrous metals will be covered.

Fundamental cause of spalling is the inability of a refractory to absorb or resist stresses set up by its expansion or contraction.

Spalling Causes Serious Trouble—There are three main types of spalling: Thermal, mechanical, and structural. Thermal spalling is due to expansion or contraction brought about by fluctuation in furnace temperature. It eventually results in loss of the fireface portion of the brick. Maximum ability to resist stresses due to thermal expansion and contraction can be expected from brick having low modulus of elasticity with high modulus of rupture. Low thermal expansion and high heat conductivity in a refractory also minimize thermal spalling.

Mechanical spalling is caused by improper design (which sets up excessive stresses when the brick expand) or faulty furnace construction or operation. Rapid heating of wet brick, abuse in removing clinker and slag, pinching (as in an arch which is keyed too tightly), thin joints, and no provision for expansion are service factors which increase mechanical spalling. To resist mechanical spalling, the brick should be strong, tough and accurately shaped.

Structural spalling results from structural changes within the brick itself—that is, changes of volume. Slags and fluxes, character of material in the joints, and amount of insulation are service factors involved with this type.

Of the three types, thermal shock is the most common cause of spalling—especially in silica, burned magnesite and burned chrome brick.

Disintegration of a refractory because of loss of strength stems from several causes. It may occur because the pores become filled with salts that crystallize and set up large stresses. This cause of failure is common in intermittently operated paper plant recovery furnaces.

Carbon disintegration results when carbon monoxide comes into contact with iron oxide, present in a refractory, at about 930° F, causing deposition of carbon within the brick—which may continue until the stresses set up cause rupture or disintegration.

Chrome-magnesite brick in contact with iron oxide and an oxidizing atmosphere in the temperature range of 2800° to 3200° F expand rapidly, resulting in iron oxide "bursting." Chlorine gas causes a reduction in strength of various types of refractories. In tests at 1742° F for 72 hours, magnesite and chrome brick lost 100 per cent of their original cold crushing strength when exposed to chlorine; silica and fireclay brick lost about 20 per cent; and high alumina brick lost about 5 per cent.

Fig. 4—Effect produced by surface peeling in aluminum-silicate refractories due to reaction with alkalies and surface-deposited carbon

TABLE I
ASTM STANDARD CLASSIFICATION FOR INSULATING FIREBRICK

Group Identification	Reheat Change Not More Than 2 Per Cent When Tested at	Bulk Density Not Greater Than
Group 16	1550° F (845° C)	34 lbs. per cu. ft.
Group 20	1950° F (1065° C)	40 lbs. per cu. ft.
Group 23	2250° F (1230° C)	48 lbs. per cu. ft.
Group 26	2550° F (1400° C)	52 lbs. per cu. ft.
Group 28	2750° F (1510° C)	60 lbs. per cu. ft.

A sixth group, Group 30, is usable for inner furnace linings at temperatures up to 3000° F.

Abrasion is the wearing away of refractory surfaces by the scouring action of moving solids. Abrasive agents may be large pieces of material in the charge, such as metal and coke in cupolas, or materials carried in the furnace flame or present in gases moving at high velocity. Removal of clinker with a slice bar also destroys the brickwork. Occasionally, a very viscous slag might protect a refractory wall from abrasion, but slag and abrasion combined, as they frequently are, can ruin a refractory lining faster than any other combination of forces.

Some refractories lose volume through vaporization of their ingredients. Carbon brick, for example, vaporize in an oxidizing atmosphere above red heat. Silicon carbide brick in certain atmospheres may oxidize and lose carbon, creating free silica, which causes expansion and reduces the brick's strength. Carbon deposited on refractories and subsequently burned off can bring about localized reducing conditions and high temperatures that may cause the brick's silica to be reduced and vaporized.

Refractory Types, Their Properties and Service Behavior—Refractories are classified according to chemical composition into four major groups: Alumina-silica, silca, basic and special refractories. In discussing the various types, it is not possible here to

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do more than touch on the major properties and behavior of each. Further information will be given in subsequent articles as to the suitability of refractories for specific furnace parts.

The alumina-silica group includes refractories composed almost entirely of alumina and silica, with minor amounts of other oxides. Alumina content ranges from less than 15 per cent to more than 99 per cent, with silica the only other major constituent. Fireclay refractories contain up to 50 per cent alumina, high alumina materials contain over 50 per cent. So-called Sillimanite (actually Mullite) refractories are made from kyanite or other compounds of alumina and silica and contain a little over 60 per cent alumina. Fused alumina refractories have 85 per cent or more of Al_2O_3.

Fireclay brick (made from naturally occurring refractory grade clays) are by far the most widely used type of refractory. They comprise 73 to 75 per cent of all refractories produced in the United States. The great majority of fireclay brick are classified as "high duty." The terms low, intermediate, high and super duty refer primarily to the pyrometric cone equivalent (PCE) of the brick.

High duty (first quality) fireclay brick are usually made of a combination of flint fireclays, which are refractory but not plastic, and highly plastic fireclays that are less refractory. In the United States, fire clays are found largely in three major producing districts — Pennsylvania, Kentucky and Missouri. Other less extensive deposits are worked in Illinois, Ohio, Colorado, Texas, Utah, New Jersey, Washington, Maryland, California and Georgia.

Fireclay brick are made by hand molding, stiff-mud repressing, power pressing, air ramming and slip casting. The power press process is now used for the majority of these brick.

Known As "Workhorse" Refractories—High duty fireclay brick have a PCE not lower than cone 31-32 (3056-3092° F) or not more than 1.5 per cent deformation in the 2460° F load test. They resist abrasion well, except at very high temperature and are subject to serious spalling only in rapidly fluctuating temperatures. Since they soften progressively as the temperature rises above 2300° F, they do not have as good load bearing ability as some other refractories in applications where they are surrounded by very high temperatures. They are the "workhorse" refractories, being low in cost and used wherever they are adequate for the service conditions. Second and third quality brick have properties similar to those of first quality brick, except that they have lower fusion points.

One of the types of high duty fireclay brick that deserves special mention is the siliceous fireclay brick made from New Jersey clays. It contains 75 to 80 per cent silica and 15 to 20 per cent alumina. In some locations these brick expand slightly and resist spalling and other service conditions better than do super duty fireclay brick. They are not readily penetrated by highly alkaline slags, and hence do not peel as badly as regular high duty brick when subjected to this type of slag attack.

Intermediate duty (second quality) brick must meet the ASTM requirement of a PCE not lower than cone 29 (2984° F), or not more than 3 per cent deformation in the 2460° F load test. Low duty (third quality) brick must have a PCE of cone 19 (2768° F) or higher. Super duty fireclay brick must have a PCE not less than cone 33 (3173° F), not more than 1 per cent linear shrinkage in the change test (2910° F), and not more than 4 per cent loss in the panel spalling test (preheated at 3000° F). These brick are made by the power press method at high pressure and are then burned to high temperatures, giving a dense product that has higher resistance to temperature, slag attack, abrasion and spalling than do high duty brick. These brick—especially the high-fired type—represent the highest degree of perfection yet reached in the development of fireclay brick of ordinary alumina-silica ratio. For special shapes, brick of the same essential properties as either the regular or the high-fired super duty brick are made by a special air-ramming process. Super duty brick are used where service is too severe for high duty brick, and find some use in most furnaces in every type of industry.

Earmarked For Specific Applications—Several types of fireclay brick, having different compositions or produced by special processing, are in general use for specific applications. Ladle brick, one of a group called —pouring pit refractories, are an example. These brick have properties that vary considerably. The type most used is power-pressed or stiff-mud, low duty brick that are characterized by high bulk density and low porosity. They overburn when installed in open-hearth steel ladles, developing very high permanent expansion. Thus the joints are closed at the surface in contact with the molten steel, forming a lining that is practically monolithic.

Hot top refractories are generally low or intermediate duty fireclay brick produced by the stiff-mud process. They possess good resistance to thermal shock and sufficient mechanical strength to withstand handling.

Sleeve brick, used in bottom-pour ladles, are usually low or intermediate duty fireclay brick of the same general type as ladle brick. They have good resistance to thermal shock as well as to slag and metal attack.

Nozzles are usually made from low duty fireclay and should have properties similar to those of ladle brick. Some operators prefer a more refractory fireclay nozzle with a PCE of about cone 30 (3002° F). Special refractory materials, such as Sillimanite, clay-graphite and the basic

(*Please turn to Page* 110)

TABLE II
CONSTITUENTS, MELTING POINTS AND SOURCES OF REFRACTORY MATERIALS

Constituent		Approximate Melting Point °C.	Approximate Melting Point °F.	Sources
Silica (Cristobalite)	SiO_2	1728	3142	Quartzite, Sand
Kaolinite	$Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$	1785*	3245*	Fireclay, Kaolin
Mullite	$3Al_2O_3 \cdot 2SiO_2$	1830**	3326**	Kyanite, Sillimanite, Andalusite, Electric Furnace Melts
Forsterite	$2MgO \cdot SiO_2$	1910	3470	Olivine
Alumina (Corundum)	Al_2O_3	2045	3713	Bauxite, Diaspore
Chrome Ore	$(Fe, Mg)O \cdot (Cr, Al, Fe)_2O_3$	Above 1970	Above 3578	Chrome Ore
Spinel	$MgO \cdot Al_2O_3$	2135	3875	Synthetic (Electric Furnace)
Silicon Carbide	SiC	Dissociates Above 2500	Dissociates Above 4532	Synthetic (Electric Furnace)
Beryllia	BeO	2520	4568	Beryl
Lime	CaO	2570	4658	Limestone
Zirconia	ZrO_2	2715	4919	Zirkite, Baddeleyite
Graphite	C	***	***	Carbon (Coke, Anthracite)
Magnesia	MgO	2800	5072	Magnesite, Sea Water

* Temperature of complete melting. Partial melting begins at 1549° C. (2820° F.)

** Dissociates into corundum (Al_2O_3) and liquid at 1830° C. (3326° F.). Entirely liquid at approximately 1950° C. (3542° F.).

*** Carbon in the ordinary sense is infusible. It volatilizes without melting at ordinary pressures—above 3316° C. (6000° F.). It is consumed rapidly at temperatures above bright red heat under oxidizing conditions.

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PRODUCTION OF WROUGHT IRON

The authors trace the development of the wrought iron industry from prehistoric times up to and including today's most scientific processes

SOMEWHERE in the western part of Asia, hot bed of the human race, the iron industry was cradled by prehistoric man due to his using lumps of iron ore in place of cooking stones and finding of a useful malleable material suitable for various tools of the era by the application of air produced by various types of skin bellows to iron ore and charcoal on some rustic hillside. This method is still being used by some tribes in Africa today.

Then through the work of the iron monger, the alchemist, the armorer, the jeweler, we come to the development of the Catalan forge. This direct reduction process reached its peak in the use of the American bloomery around the Lake Champlain district during 1882. However, metallurgists both here and abroad are still at work on methods of producing wrought iron or steel direct from the iron ore.

Now the English metallurgists and operators take over. The literature notes the names of Simon Sturtevant, Dud Dudley, Abraham Darby, Thomas and George Cranage, and Peter Onions each of whom contributed his bit to the development of methods of manufacturing wrought iron—even though their methods were unsuccessful and short lived. In 1784 Henry Cort patented the following process: "For the preparing, manufacturing, and working of iron from the ore, as well as from sow and pig metal, and also from every other sort of cast iron, I make use of a reverberatory or air furnace, the bottoms of which are laid hollow or dished out, so as to contain the metal when in fluid state." This he worked to a successful issue; therefore, to him belongs the credit for first using coal for refining iron, and for introducing what was later known as the puddling process for the manufacture of wrought iron. Bottoms were solid and made of sand, which caused slow working and made it essential to use low silicon iron.

The original process was improved by use of air-cooled, cast iron bottoms, although a super-imposed

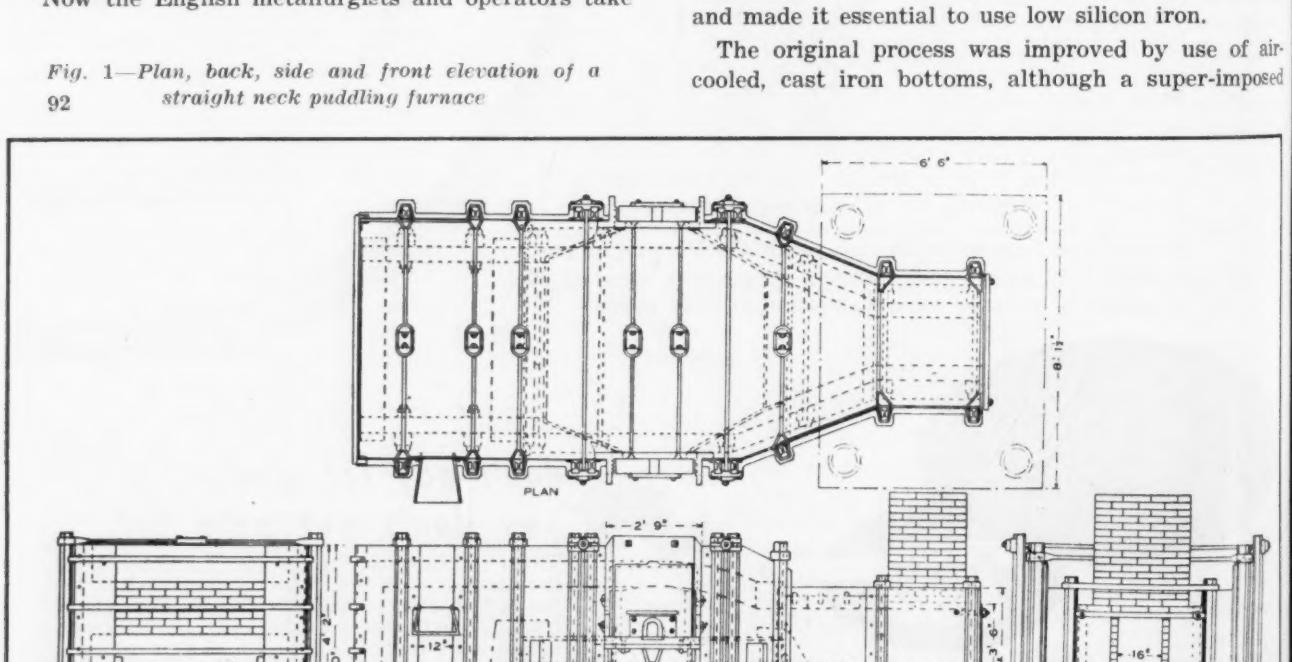
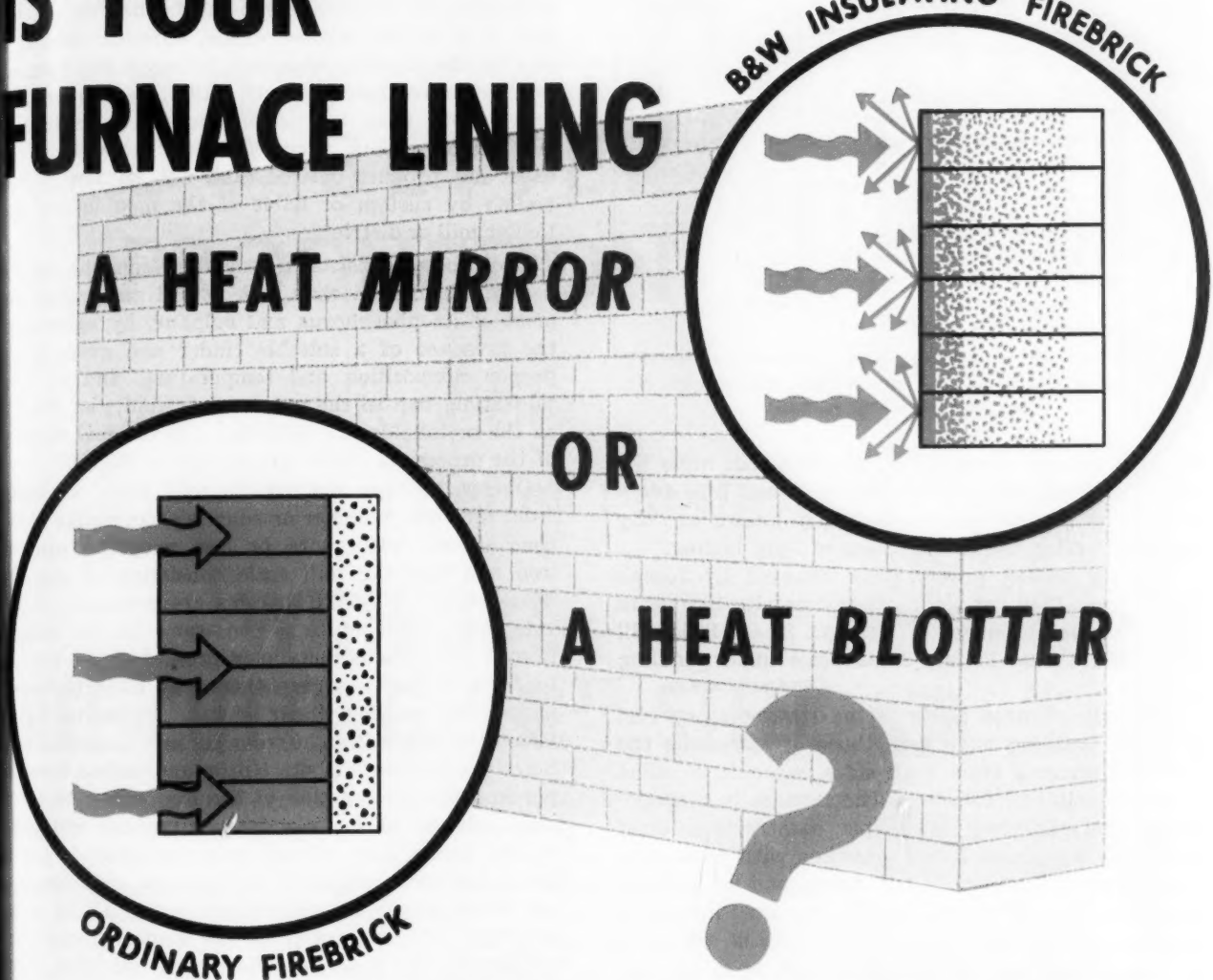


Fig. 1—Plan, back, side and front elevation of a straight neck puddling furnace

IS YOUR FURNACE LINING A HEAT *MIRROR* OR A HEAT *BLOTTER*



When furnaces are constructed of dense firebrick, the walls and roof soak up heat because of their high heat-storage capacity . . . they act as "heat blotters". This results in serious heat losses—losses that are actually measurable in higher fuel costs.

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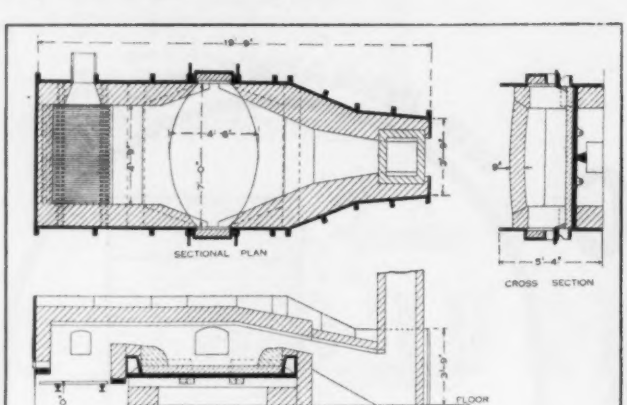


Fig. 2—Plan, cross and logitudinal sections of a drop neck puddling furnace

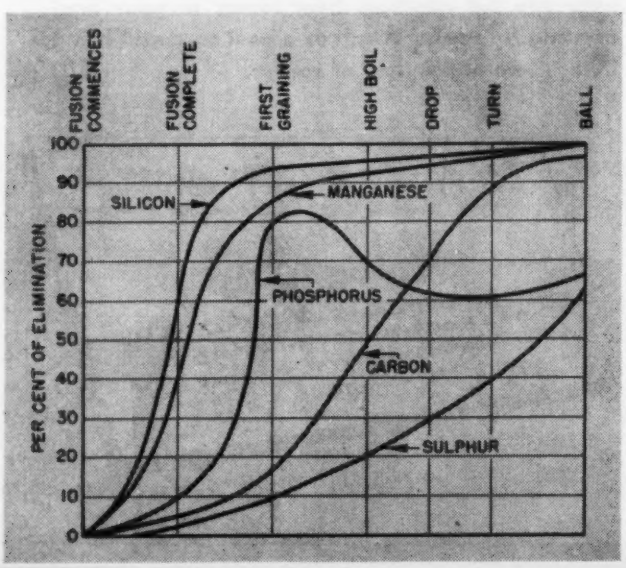
working bottom of sand was still retained, while the use of run-out metal made higher silicon iron available. The process was subsequently known as "dry puddling" after the introduction of "pig boiling."

The pig boiling process was invented by Joseph Hall about 1830, and for approximately 100 years was the chief producer of wrought iron. It is still the practice used in any small scale hand puddling operation.

The only changes made in the reverberatory furnace for puddling have been those of increasing the size and working from both sides, when it is called a double puddling furnace. The furnace is a single-bedded reverberatory of simple construction, lined externally by plates bound together with rods, provided with a stoke-hole for firing and a working door at the middle of the hearth, and lined internally and roofed with firebrick. The bottom is composed of heavy, cast iron plates, which rest upon an iron frame to permit free circulation of air beneath.

The working hearth, oblong in form, is surrounded by hollow cast iron chills, through which air generally circulates, although steam or water is sometimes used. Whatever cooling medium used, objectives are to cool the working lining of the hearth and to prevent the fluid cinder from finding egress. Hearth sides are faced with iron oxide, commonly iron ore,

Fig. 3—Sequence of the puddling process reactions



and the bottom is covered to a depth of 3 to 5 inches with practically pure iron oxide, made by oxidizing wrought iron or steel scrap in the hearth. It was and is a simple, almost crude, furnace, limited in size by the capacity of a man to reach any part and exert effective force therein. Details such as grate area, depth from top of fire bridge to grate bars, and height of flue, vary with the fuel and pig iron used and product desired, and are all largely controlled by custom or habit of the men in any particular mill or district.

The process consists in removing from the pig iron nearly all of its carbon, silicon and manganese, and most of its phosphorus and sulphur, by agitation in the presence of a suitable cinder and gases of the proper composition and temperature, and by crystallization, due to the greater infusibility of the iron as the metalloids are oxidized. Operational sequence of the process is shown graphically in Fig. 3.

Oxides charged are puddle mill scale, or cinder from the rolls, hammer or squeezer, consisting of ferrous silicate with more or less magnetic oxide of iron and finishing mill scale consisting of magnetic oxide of iron. Their functions are primarily to provide the oxygen which is necessary for the elimination of the various metalloids present in the pig iron to form a slag to retain them and later to become part of the welding cinder or flux. Incidentally, they lessen the loss in weight from pig iron to puddle bars. Since the removal of both silicon and carbon from the pig iron is due to action of the iron oxide, an equivalent amount of metallic iron is reduced and added to the bath. Part of this gain, however, is lost in the subsequent stages of the process, resulting in a net average loss of about 5 per cent. At all times condition of the oxygen in the cinder is controlled by the furnace gases, as affected by condition of the fire and damper position.

Objectives of the agitation, which are as equally important as the cinder and is chiefly accomplished by the rabble (effectively assisted by the high-boil) are to produce as uniform conditions as possible throughout the bath, to break up the larger masses of iron that tend to form and to prevent, as far as possible, the settling of the iron in a partly refined condition on a relatively cold bottom. The more fluid the cinder, the more vigorous the agitation must be, and the finer will be the grain of the resulting iron.

The grains of iron, as finally formed, vary in size from 1/32 to 1/16-inch in diameter, each being surrounded by cinder. These form small clusters of six to eight grains, which clusters, in turn, collect in grotesque forms, all loosely held together by the cinder, which, if taken from the furnace and cooled can be parted readily between the thumb and fore finger.

The ball is drawn in the form of a rough sphere its interstices being filled with cinder; by squeezing its shape is changed to that of a crude cylinder about 6½ inches in diameter. Shape of the individual grain is altered but little, while most of the cinder is expelled, except that which is held by cohesion surrounding the individual grains. The cross

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section of the squeezed bloom, about 33 square inches, is reduced by rolling to 3¾ square inches into a puddle bar 6 inches by ⅝-inch.

Next step is that of forming the pile. Here the one requirement is the uniform distribution of the iron, to avoid possible spaces in which cinder may be trapped, when by the sealing of the pile exterior it may fail to find egress and thereby cause laminations. Danger from this source is increased by size in a more rapid ratio than by a direct increase in the pile mass.

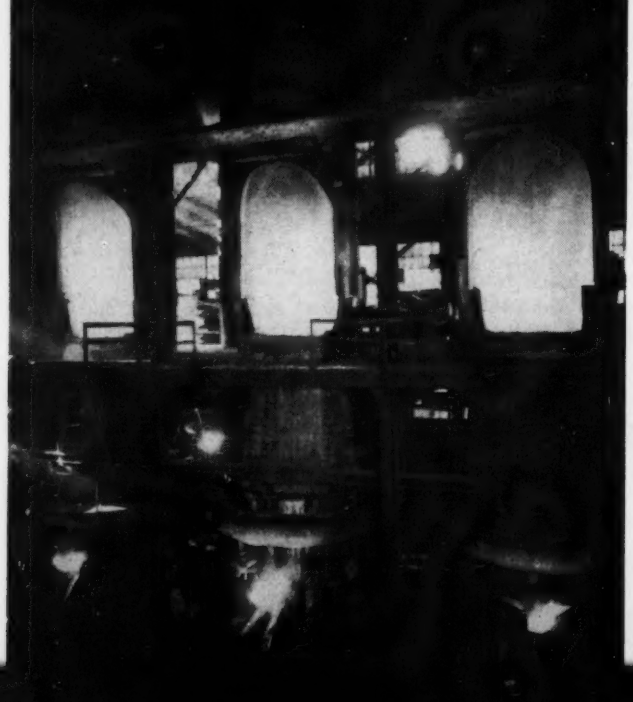
Heating is an association of temperature with the continuation of the reactions of the puddling furnace. Reactions are most marked in large piles, since the long period taken to acquire temperature necessary for welding, which is considerably higher than in the puddling furnace, causes a reduction of some of the oxide in the puddle bars and an elimination of carbon.

The final step, rolling, has two vital functions; that of preventing as far as possible the sealing of the ends and sides of the pile until the excess of liquid cinder has been expelled, since its presence causes laminations; and reduction in section from the puddle bar to the finished product—the greater the reduction, the better the result. The highest quality, called "stay bolt iron," was obtained by a double reduction.

Wrought iron, when properly made, consists of a series of units of fibrous formation in a matrix of ferrous silicate, the units being welded together with an intervening cinder of magnetic oxide. The latter is plainly visible under a microscope, and in part to the unaided eye, and is not infrequently mistaken for the puddle bar fiber.

Busheling consists of the welding together of miscellaneous scrap, thrown promiscuously on the hearth of a furnace similar to a puddling furnace. Subsequent treatment of the balls is identical with that of puddle balls. In the days when scrap emanated wholly, or largely, from iron structures, the product was wrought iron of good quality, though somewhat more difficult to weld than puddle bar. In today's practice, when scrap is of most nondescript character, with steel greatly predominating, the product—it should not be called wrought iron—our nomenclature lacks a fitting term—is lacking in uniformity, and the best attributes of genuine wrought iron. Several isolated plants still operate on this basis today.

Fig. 4—Cupolas are used for melting iron in first step of modern day wrought iron production



Only those who have stood before a puddle furnace rabbling a heat or have taken puddle balls up the run to the squeezer, or have rolled blooms through the mill making muck bar know the spectacular attraction of this now nearly obsolete method of wrought iron manufacturing. Except for a few isolated, very small scale plants mostly in foreign countries the conventional puddle furnace is now history. Its failure was due to lack of ability as constructed to achieve results required of American large scale production methods, the passing of the puddler, high labor costs, restricted individual output and lack of industry wide quality control along with competition from the modern steel mill.

It has been pointed out that the union or combination of both the metal and slag to produce finished wrought iron has been accomplished by various different methods. In the puddling process, for instance, the puddler, by laborious handwork, mixed the components, with the result that the combined efforts of a puddler and his helper in a ten-hour turn yielded only about 2800 pounds of finished wrought iron. Obviously, the output of wrought iron was definitely limited by two factors; namely, amount of equipment in use, and number of skilled men that could be employed to operate it.

A study of the process revealed that certain essential reactions took place within the puddling furnace. These are listed as follows: To melt and refine the base metal, to produce and keep molten a proper slag and to granulate, or disintegrate, the base metal and mechanically incorporate with it the desired amount of slag.

What is now known as the Byers process for manufacturing wrought iron conforms to the hand-puddling method in all of these three essential steps. Each step, however, is separated and carried out in individual pieces of equipment best suited to that operation. The process was placed on a commercial basis Oct. 8, 1930, when the largest wrought iron plant in existence was formally dedicated at Ambridge, Pa. The process has resulted in a magnitude of production, control of operations, and assurance of uniformity of product undreamed of by the old ironmasters.

Raw material from which wrought iron is made consists of pig iron, iron oxide, and silica. The pig iron is melted continuously in cupolas, tapped into ladles where it receives a special desulphurizing treatment, and is then conveyed to a bessemer converter, where it is purified to the highly refined state required for the base metal in quality wrought iron. It is then carried by crane and ladle car to a processing platform and poured into the processing machine ladle.

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In the meantime, an exact silicate slag formed by melting together iron oxide and certain siliceous materials in special rotary furnaces is poured into a ladle, which is placed on a ladle car so it can be moved to the different stations representing stages in the process. The first station is directly below the processing machine.

Next follows the key operation of the process—that of refined metal disintegration and slag incorporation. The molten refined iron is poured at a predetermined rate into the ladle containing molten slag. The processing machine automatically oscillates as well as moves forward and backward, insuring a uniform distribution of the refined metal into the slag.

Since slag temperature is maintained a few hundred degrees lower than the "freezing point" of the refined iron, the latter is continuously and rapidly solidified. This rapid solidification liberates gases dissolved in the molten metal with such force that the metal is shattered into small fragments which settle to the bottom of the slag ladle. Due to the welding temperature and fluxing action of the siliceous slag, these fragments cohere to form a sponge-like ball of iron impregnated with liquid slag.

Immediately upon completion of the pour, the ladle is transferred over a circular track to the next station, picked up by a crane and the surplus slag poured off into an adjoining ladle. The ladle now containing the slag is moved around the track to the furnace station where slag is replenished. The ladle is then moved again into position under the processing machine to begin a new cycle.

Meanwhile, the sponge balls weighing 6000 to 8000 pounds are dumped, one every five minutes, on the platform of a 900-ton electrically driven press. This press ejects the surplus slag and welds the cellular mass of slag-coated particles of plastic iron into a solid bloom.

The bloom of wrought iron formed during the pressing operation is rolled on a blooming mill to produce slabs or billets which are subsequently rolled on skelp, plate, sheet, or bar mills into desired products.

Thus, from a study of the traceable history of wrought iron it is learned that many different processes of manufacture have been employed in its production. These different stages of development, each designed to improve quality and/or increase output, left unaltered the natural combination of high purity iron and siliceous slag which is found only in wrought iron. From the standpoint of practical application and installation problems, the important characteristics of wrought iron include—resistance to corrosion, resistance to fatigue failure, the ability to take on and hold protective metallic and paint coatings, good machining and threading qualities and good forming and welding qualities.

Within recent years numerous changes have been made in foundry practice with a view to improving the properties of cast iron for special applications. Also, much work has been done along the line of alloy additions. Some of the alloys used include nickel, copper and chromium which are intended to increase

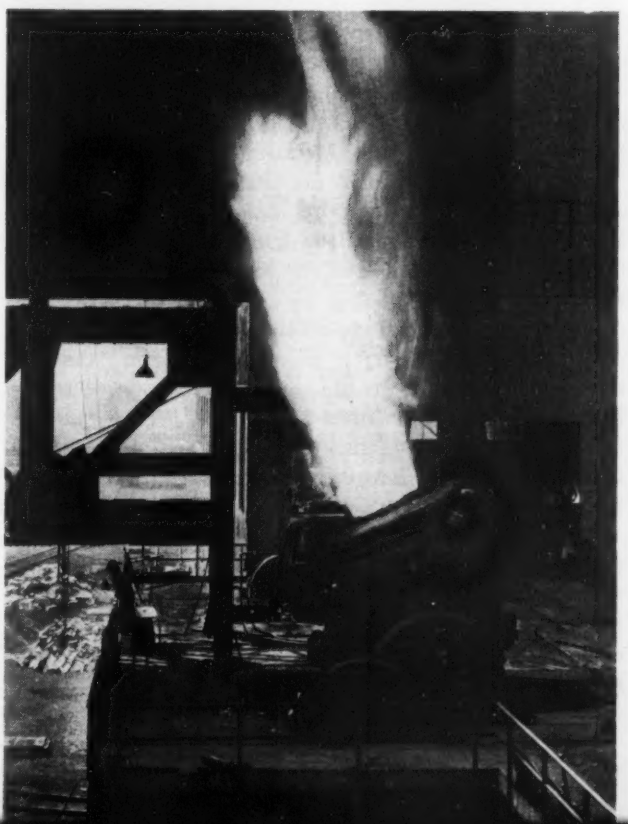
Fig. 5—Siliceous slag of an exact composition used for wrought iron production is produced in special rotary melting furnaces

strength or corrosion resistance or both.

While the use of alloys has resulted in greater tensile strength and increased wear resistance, alloyed cast iron is not, however, greatly improved in ductility so, in this respect, it must remain in the broader classification of brittle materials. Little is known as yet about the influence of these alloys on the metal's resistance to corrosion.

From the tonnage standpoint, the two most important modern processes for converting pig iron into a malleable product are the bessemer converter, invented in 1856 by Henry Bessemer, and the open-hearth furnace, invented in 1861 by William Siemens and successfully adapted to iron refining in 1868. Bessemer's development was intended to produce wrought iron of superior quality and at a lower cost than was possible by the hand-puddling process, but the product of his converter was steel, since it did not contain the siliceous slag which is always present

Fig. 6—Bessemer converters are employed to refine the molten iron used to produce wrought iron



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in wrought iron. Outwardly, this new product looked like wrought iron, but had different physical characteristics. Also, there was promise of larger production and consequently lower price.

It was not until 15 years after bessemer and open-hearth steel began to be used generally that much scientific attention was given to the corrosion-resisting qualities of this new metal. Then, in 1905, a group of American farmers appealed to the Department of Agriculture to investigate causes of "fence wire corrosion." Prior to the time that steel fence wire was introduced, wrought iron was used for the manufacture of wire. Conclusions resulting from investigations carried on by the Department of Agriculture were in part, "The modern bessemer or open-hearth steel rusts more rapidly than iron wire, and manganese, especially if it is unevenly distributed in the steel, is at least in part the cause of the trouble."

These studies led to many modifications in steel practice and resulted in numerous attempts to overcome the lack of corrosion resistance. One eminent metallurgical authority, J. S. Trinham, in an address before the Birmingham Metallurgical Society, said: "It has often occurred to me that the consuming desire of the steel maker is to make a steel which will last as long as wrought iron has already lasted. Imitation, it appears, is still the sincerest form of flattery."

Acting on the findings of the Department of Agriculture that the purity of wrought iron was responsible for its long life, commercially pure open-hearth iron was developed about 1907. This was the first of many subsequent attempts to emulate in other ferrous metals the long life which has always characterized wrought iron.

Not satisfied that purity alone was responsible for the long life of wrought iron, another school of thought carried on an independent study and, having found traces of copper in some of the old samples, believed they could achieve their desire for longer life through the alloying of steel with copper. And so, about 1911, a fourth ferrous metal, copper-bearing steel, was announced.

Still another group, accepting neither the purity theory nor that supporting the addition of copper, believed that by combining both purity and copper the desired results would be achieved. Hence, about 1919 the fifth type of metal made its appearance.

It was a copper-bearing, semi-refined, open-hearth iron having the following typical chemical composition: Carbon, 0.030; manganese, 0.120; sulphur, 0.035; phosphorus, 0.005; silicon, 0.005; copper, 0.240; making a total metalloid content of 0.435 per cent.

A sixth type of ferrous metal was introduced about 1928. It was essentially the same as its predecessor, except that the copper content was increased and a small quantity of molybdenum was added.

During recent years a new group of steels has appeared on the metallurgical horizon. This group includes the low-alloy high strength steels, many of which are claimed to possess both greater strength and greater corrosion resistance than older steels and irons previously described. While these new steels vary considerably in chemical composition and physical properties, they all might be considered as generally similar.

Analyses of other steels belonging to the same group could be listed but the ones shown provide an indication of the attention being given to the problem of durability. Since corrosion is perhaps the most variable factor that confronts the user of metals it will be necessary to await results obtained from the test of time before attempting to evaluate the many claims made for the superior corrosion resistance of these new steels.

Wrought iron, on the other hand, has remained unchanged in basic chemical and physical characteristics. It has been subjected to the most severe tests of time and has withstood them in such a manner as to assure its continued use for hundreds of services where durability is of primary importance.

Physical properties of wrought iron are largely those of pure iron. The strength, elasticity, and ductility are affected to some degree by small variations in the metalloid content and in even greater degree by the amount of the incorporated slag and character of its distribution. Up to certain limits, ductility is increased by extra working, due to its effect in causing a finer distribution and more thread-like character of the incorporated slag. This is accomplished in modern practice through the large reduction of section obtained in rolling or forging large initial blooms into proportionately small final sections; or it may be obtained by rolling smaller initial masses to bar sections, which in turn are built into "piles," heated to welding temperature and then rolled to desired forms. In common practice this is done once for "single-refined" wrought iron and twice for "double-refined" products.

The ultimate tensile strength and ductility of wrought iron, unlike those properties of steel, are greater in the longitudinal or rolling direction than in the direction transverse to rolling. This difference is due to the nature of the slag distribution throughout the metal in the two directions.

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LOADING STATION A
CUTTER
LOADING STATION B
TABLE
REVERSE AND DOGS
RATE DOG
RATE DOG
STOP AND REVERSE DOGS
1. Operator loads (A) and engages Mono-Lever. Table advances in rapid traverse to point of cut on workpiece (A) at (2).
2. Feed dog changes rapid traverse to selected table feed for cut on (A). Operator loads at station (B).
3. Upon completion of cut stop and reverse dogs reverse table in rapid traverse to point of cut on workpiece (B).
4. Feed dog changes rapid traverse to selected table feed on (B). Operator unloads and reloads at Station (A).
5. Stop and reverse dogs reverse table in rapid traverse to point of cut on workpiece (A).
6. Cycle repeats from (2).

Diagram shows how operator set up table for automatic reciprocal milling operation. He engaged the Mono-Lever once for entire run. Machine required no further attention other than loading workpieces.

COMPARE

Production by old method.

28%

Production gain using a Kearney & Trecker Milling Machine with Mono-Lever Control and Automatic Table Cycle.

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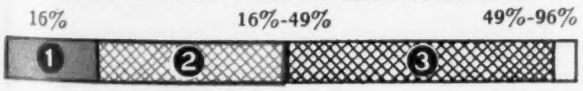

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However, within the past few years development of rolling procedure has made possible an equalization of the normal ultimate strength and ductility in the two directions. This important advance in technique has had a marked influence in making possible the use of wrought iron plates for applications where severe fabrication requirements must be met. Current specifications of the American Society for Testing Materials covering wrought iron plates—designation A 42—recognize this development.

The value for the yield point of wrought iron is the same whether the material is tested in the longitudinal or transverse direction. The same statement also holds true in regard to the metal's shear strength. Yield strength of the material as well as its shear strength are, of course, important factors in the design of structures for static loading.

Since scientific control is now possible, wrought iron produced by the Byers process is uniformly high in quality. Blisters, once a common defect in even the best wrought iron pipe, are now practically unheard of. For many years, production of wrought iron plates was not commercially feasible. Now thousands of tons are produced annually. The bendability of wrought iron pipe has been improved with the result that wrought iron coils bent to small radii are produced daily. Uniform, lower cost staybolt-iron is available to railroads as a result of recent technical advances. These are only a few gains made possible by scientific control.

Physical Properties of Unalloyed and Nickel Alloyed Wrought Iron

	Unalloyed Wrought Iron	3% Nickel Wrought Iron
Tensile Strength, psi	48,000	60,000
Yield Point, psi	30,000	45,000
Elongation in 8 inches, per cent	25	22
Reduction of area, per cent	45	40

Further advances are constantly being made, and the alloy wrought iron field has intriguing possibilities. For example, large scale experimental work has revealed that an addition of 1½ to 3 per cent nickel markedly increases the strength of wrought iron. This is shown in the accompanying table.

These alloy wrought irons respond readily to heat treatment, and tests at sub-zero temperatures also show little reduction of impact strength. To the best of our knowledge, all other desirable properties are retained.

Studies, such as this, may lead to production on a commercial scale of materials never before available which will combine the proved corrosion resistance and toughness of wrought iron with the greater physical strength of alloyed metals.

Better Lighting Conditions

(*Continued from Page 85*)

Equipment Factors—Lighting equipment is classified according to the manner in which the light is distributed, in one of the five general types of classifications indicated in Table I.

With the exception of industrial areas where structural limitations demand the application of direct lighting equipment, adequate illumination quantity generally can be obtained with any class of equipment. For this reason, lighting quality alone governs the class of equipment to be selected.

Direct or semidirect lighting equipment requires even more careful application because its inherent light distribution characteristics make difficult the attainment of acceptable brightness ratios. Its use is limited to industrial applications where an indirect component would not materially improve the brightness ratio because of structural limitations, to commercial and industrial applications in which the lower cost of the direct lighting system is considered to be adequate compensation for the disadvantages of the compromise on lighting quality, and to supplementary lighting applications.

Initial investment, or price, too frequently is the basis of lighting equipment selection without due regard to its effect on the other cost factors. It is obvious that a saving of $5 per fixture, for example, on the initial investment for a lighting system, designed to give 10 years of service, will not compensate for additional costs of installation, operation and maintenance that very readily could amount to more than $5 per fixture per year. This procedure is all too common.

Fixture efficiency occasionally is overemphasized in the selection of lighting equipment, probably because it is thought to be a measure of seeing effectiveness. It is obvious that this is a false premise, since an unshielded light source has a higher efficiency than that of any equipment in which it is used and it is generally conceded that a shielded light source provides better seeing conditions than an unshielded one.

Cost of Lighting—Cost, being one

TABLE I
LIGHTING EQUIPMENT CLASSIFIED BY MANNER IN WHICH LIGHT IS DISTRIBUTED

Classification or Type	Per Cent Distribution: Indirect Component	Per Cent Distribution: Direct Component
Direct	0- 10	90-100
Semidirect	10- 40	60- 90
General diffuse	40- 60	40- 60
Semi-indirect	60- 90	10- 40
Indirect	90-100	0- 10

TABLE II
COST OF LIGHTING ANALYSIS CHART

Item No.	General Data	Obtained From *
1.	Total cost of lighting equipment	Equipment supplier
2.	Total cost of installation of equipment	Contractor or estimate
3.	Amortization rate in per cent	Accounting department
4.	Number of fixtures in lighting system	Lighting plan
5.	Watts per fixture	Equipment supplier
6.	Energy cost per kilowatt-hour	Electric utility
7.	Annual demand charge for lighting system	Electric utility
8.	Annual hours of operation of lighting system	Experience
9.	Number of cleaning periods per year	Experience
10.	Unit cost of cleaning equipment	Experience
11.	Number of lamps in lighting system	Lighting plan
12.	Average lamp life	Lamp supplier
13.	Net unit lamp cost (lamp only)	Lamp supplier
14.	Number of lamp replacements per year	$\frac{(8) \times (11)}{(12)}$
15.	Unit cost of lamp replacement (labor only)	Experience
	Annual Fixed Charges Or Owning Cost	
16.	Annual amortization of investment	((1) + (2)) x (3)
17.	Annual interest, taxes and insurance	Accounting department
18.	Total annual fixed charges	(16) (17) or 12.5 to 25% of ((1) (2))
	Annual Operating Cost	
19.	Annual energy cost	$\frac{(4) \times (5) \times (8) \times (6)}{1000}$
20.	Annual lamp cost	(14) x ((13) (15))
21.	Annual cleaning cost	(4) x (10) x (9)
22.	Total annual operating cost	(19) (20) (21)
	Annual Owning and Operating Cost	
23.	Total cost of lighting system	(18) (22)

* Numbers in parentheses are item numbers.

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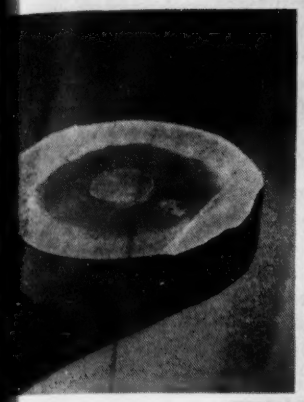
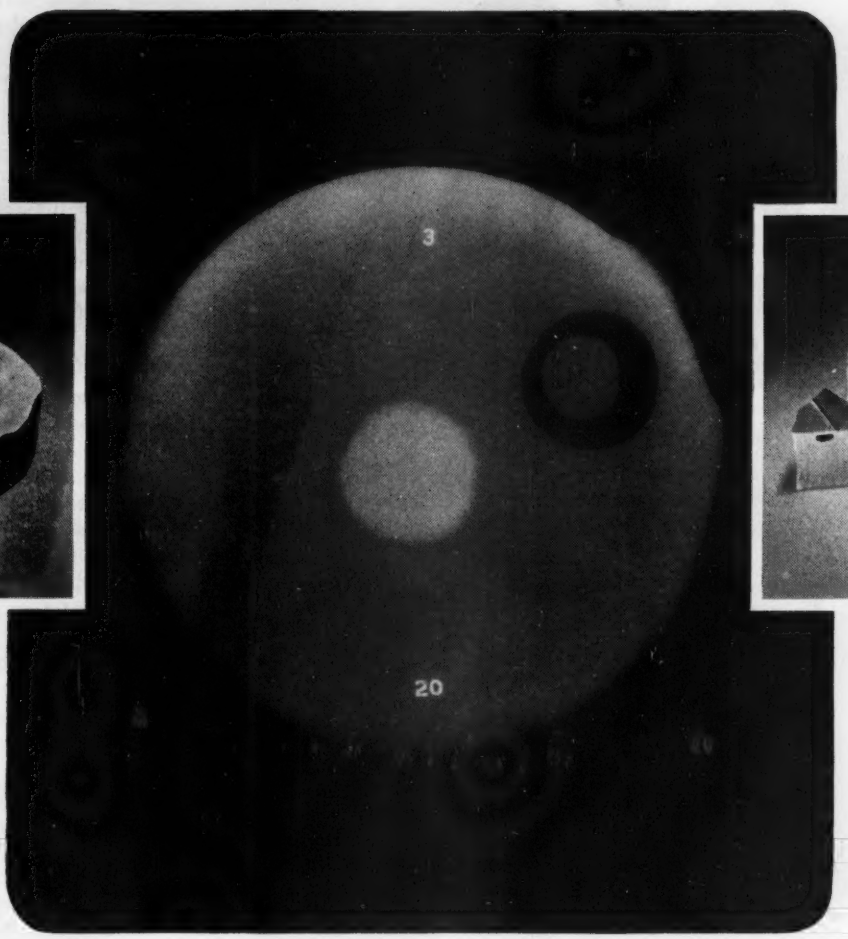
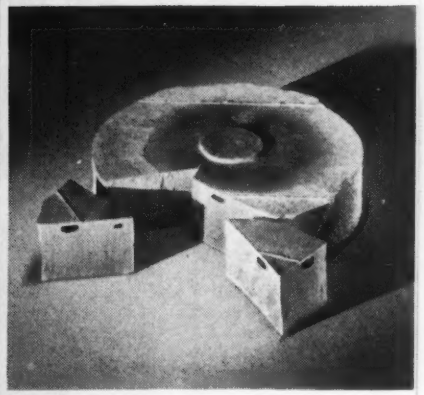


Aluminum alloy casting 2¼ x 1¼" for aircraft accessory part.





Section reveals hole detected by radiography.

Radiograph which revealed defect in casting.

Minutes of Radiography saved hours of machining

AFTER machining, this aluminum alloy casting was to be an important part in an aircraft accessory, vital to high-altitude flying. The finished part was needed quickly by the customer. Design specifications demanded high quality.

This was no time to wait for machining to disclose any defects. There was too much to lose —setup time, machining time, take-down time, as well as the reputation of the foundry.

Radiography saved all that. In a few minutes it revealed a defect that caused rejection of the rough casting at the foundry. Other castings, proved sound by radiography, were sent to the customer.

Cases like this show how more and more foundries are able to release only sound castings. Perhaps even more important, radiography is showing how to make consistently sound castings, by picturing the internal effects of changes in gating, venting, chilling, pouring temperature, and other variables.

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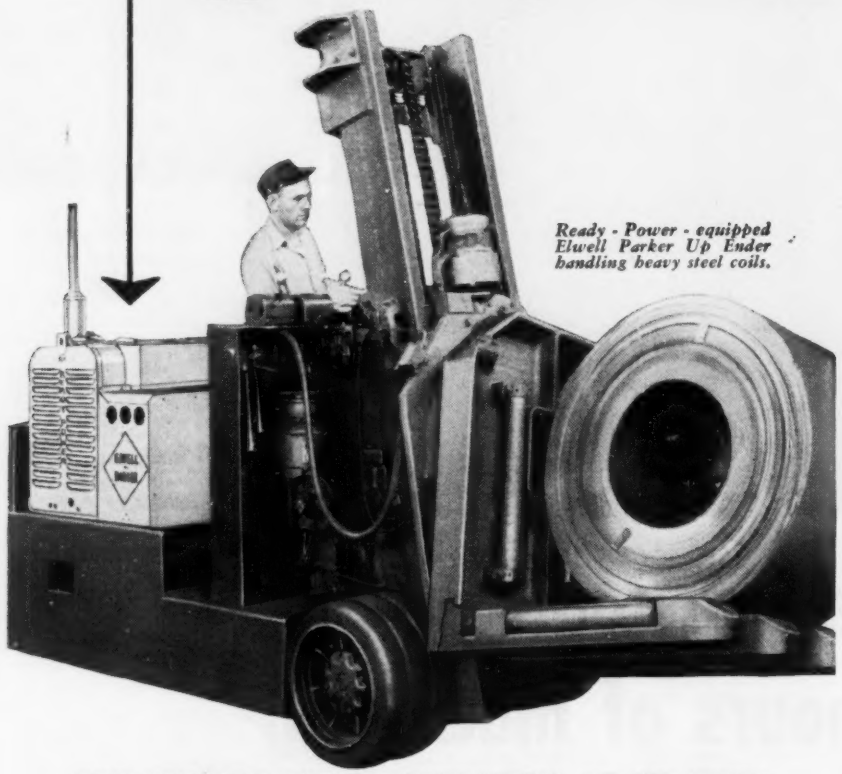

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of the major factors involved in the selection of lighting equipment, invariably enters into the appraisal of a new lighting system. The accuracy of the appraisal depends on the integrity and completeness of the cost analysis and the intelligent evaluation of intangible factors which may be equally as important to the investor as cost itself. Appraisal on equipment price alone can, and often does, result disastrously in added operating and maintenance costs, in rapid depreciation, in premature failure or in unsatisfactory performance.

Appraisal on cost alone, regardless of completeness of analysis, disregards the effects on overall operating costs due to possible differences in life expectancy of equipment, possible differences in the quality of the lighting results and, for applications where appearance is of major importance, differences in the appearance of the lighted area attributable to the lighting system. Such an appraisal also ignores those advantages and disadvantages of equipment which cannot be evaluated directly but which may affect the results quite materially. To be of the greatest value the appraisal should be not only complete but, if unlike equipments are being compared, it should be qualified by the extent of dissimilarity.

For the purpose of cost analysis, initial investment in equipment, installation cost, operating cost and maintenance cost invariably are divided into fixed charges and operating charges. These charges may or may not include indirect costs such as difference, due to lighting in construction cost, in investment and operating cost of air conditioning equipment and in electric demand charges.

Maintenance of Equipment—Maintenance of a lighting system governs in a large measure the ability of lighting equipment to perform continuously in an efficient manner. It is one of the most important but, generally, most neglected of all of the factors that influence effective seeing conditions. It is made necessary by the accumulation of dust and dirt on lighting equipment and on ceiling and walls of the lighted area, by the normal depreciation in the light output of the lamps, and by the final failure of the lamps if they are not removed from service prior to failure for reasons of economy or appearance.

Required frequency of maintenance depends on the rate of accumulation of dust and dirt, the average life of lamps, the maintenance method employed and, in the case of new light-

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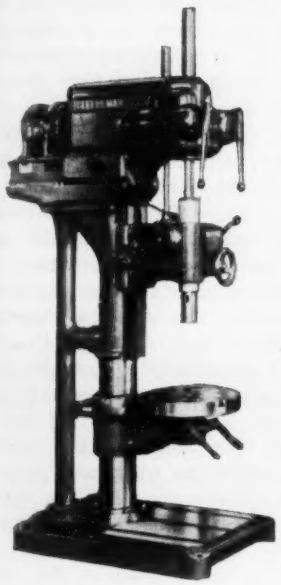

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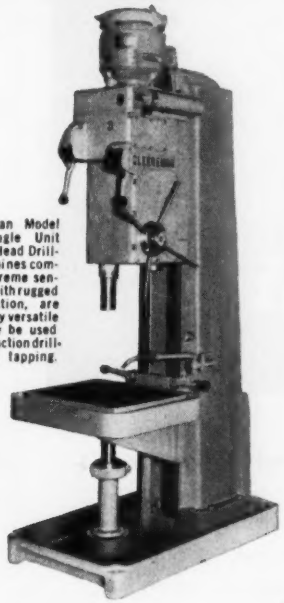

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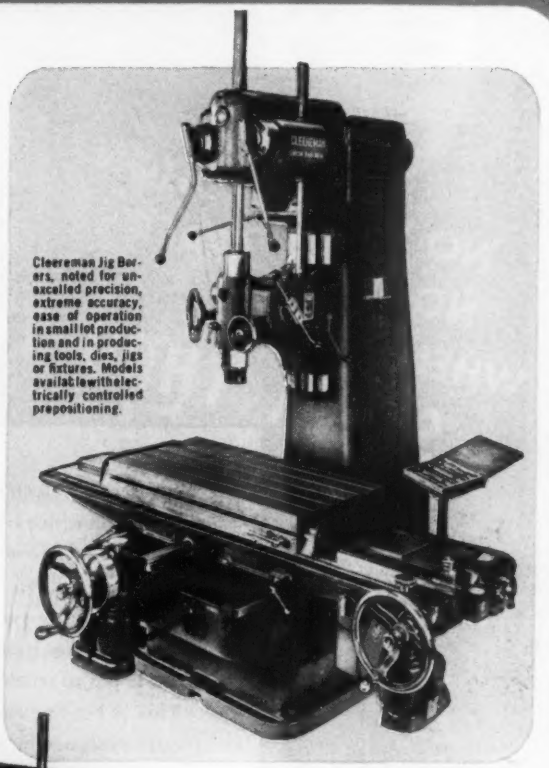

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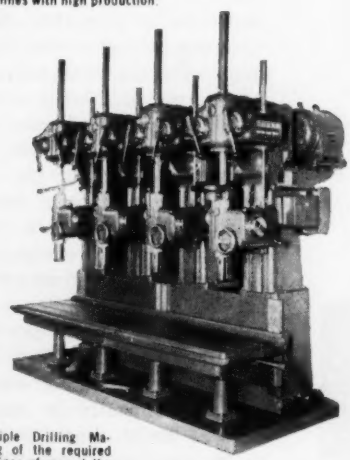

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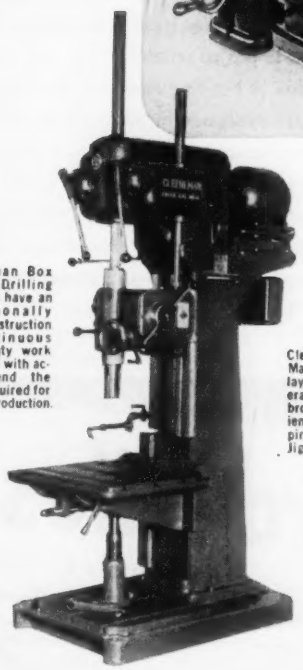

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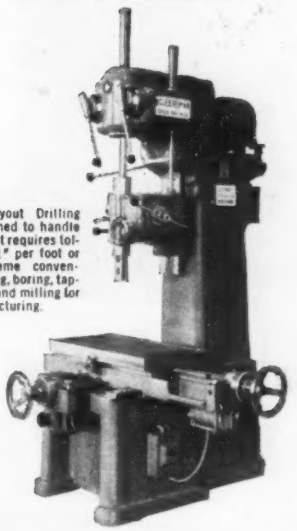

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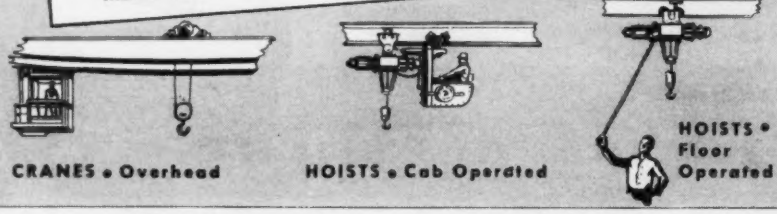

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ing equipment under consideration, the type, design and quality of the equipment. For a new installation, frequency of cleaning can be determined by taking occasional illumination readings with a footcandle meter at several important locations. When the illumination has dropped about 25 per cent of initial value, or of that after the last cleaning, cleaning of reflectors, lamps and shielding equipment usually results in greater operating economy.

The "hit and miss" maintenance operation undoubtedly is the least costly, if the sole object is to hold maintenance costs to a minimum. This type of operation involves replacing lamps only after there is positive assurance that they won't come on again, and cleaning reflectors only after dirt begins to drop off in cakes—if they are cleaned at all. To be sure, many "hit and miss" maintenance operations maintain operating efficiency better than that just described but an analysis usually proves this type of operation impractical and more costly than planned maintenance, not only from the standpoint of maintenance costs alone but also from that of lost operating time due to the necessity for a few of the operating personnel to leave their work for the maintenance operation or due to desire of a larger number of operating personnel to merely watch the operation.

Planned Maintenance—Two general methods of planned maintenance are in extensive use today, one involving periodic cleaning of equipment with the replacement of lamps as required, the other involving periodic cleaning of equipment and periodic lamp replacements before the end of rated life of the lamps. The plan to be adopted depends on a cost analysis of both methods together with any variations of these methods that are found to be worthy of consideration. It is interesting to note that most of the maintenance organizations that specialize entirely in lighting maintenance employ the second method. Since the success of their operation depends entirely on their operating economy, and since they must be concerned with the maintenance of many types and sizes of lighting equipment of various makes, their methods are worthy of consideration.

Type, design and quality of lighting equipment, type and quality of light source, accessibility of equipment for maintenance and availability of equipment for cleaning or lamp replacement, all probably will guide the decision as to maintenance method to be adopted. In any case econo-

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my will dictate periodic group cleaning of equipment, particularly in large installations where accessibility of equipment are limitations.

A plan designed primarily for use with fluorescent lighting systems is known as the "budget reduction plan." This plan is based on the following facts: 1. Labor costs for replacing lamps on an individual basis as they fail are high. 2. Very considerable savings in labor costs may be effected through budget replacement of lamps all at one time. 3. Fluorescent lamps having remarkably few early failures (less than 5 per cent failures up to 5000 hours of operation on a 3-hour cycle), with excellent efficiency and lumen maintenance, are available. 4. Lamp replacement schedule can coincide with a regular cleaning period during a 5000-hour operating period to effect even greater economy.

For the sake of simplicity the analysis is based on an installation of 1000 lamps. The results then will be on a per-1000-lamp basis.

A. First, determine the labor cost of replacing one lamp. This will vary, of course. Considering the usual routine, a very conservative figure is $1 per lamp. Seventy-five cents will be even more conservative.

B. Cost of replacing 1000 lamps individually, then, will be 1000 × 0.75 or $750.

C. It is assumed that two men can replace 1000 lamps in four 8-hour days and it is further assumed that these men are paid $25 each per day, both conservative figures. The cost of replacing 1000 lamps on the budget reduction basis, then, is 4 × 2 × 25 or $200.

D. It is assumed that 5 per cent or 50 lamps will fail prior to 5000 hours, and that they are replaced individually as in A. The labor of replacement, then, will be 50 × 0.75 or $37.50.

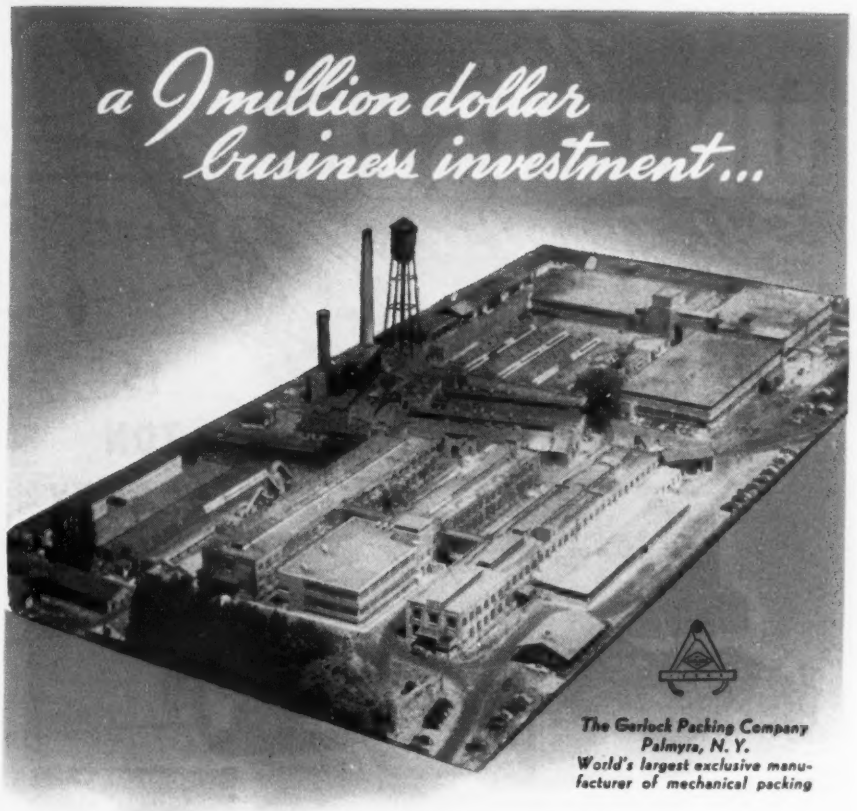
E. Since lamps will be replaced at 5000 instead of 7500 hours the added lamp cost, assuming a net cost of 70 cents for the standard 40 w fluorescent lamp, will be

$$1000 \times \frac{7500-5000}{7500} \times 0.70 \text{ or } \$233.10$$

F. Total cost of budget reduction plan is 200 plus $37.50 plus $233.10 or $470.60.

G. Saving effected by the budget reduction plan, then, is 750—470.60 or $279.40 per 1000 lamps.

From data presented before the conference on plant maintenance, Plant Maintenance Show, Cleveland, Jan. 16-19, 1950.


a 9 million dollar business investment...
The Garlock Packing Company
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World's largest exclusive manufacturer of mechanical packing

...*"Automatic" Sprinkler* protected, of course!

It's not surprising that many leading manufacturers, like The Garlock Packing Company, for example, have found that fire protection by *"Automatic" Sprinkler* earns dividends in dollars as well as in safety. The first buildings of this multi-structure facility were sprinklered back in 1923 and the initial cost of installation has long since been amortized. Subsequent new construction has also come under the vigilance of *"Automatic" Sprinkler* protection, *an investment in safety that can't be beat.*

Like Garlock, your business too, is in a position to realize the money saving advantages of fire protection by *"Automatic" Sprinkler*, and you'll find the following facts worth keeping in mind:

1. Over a half century of background in the design, manufacture, engineering, installation and maintenance of all types of sprinkler equipments, qualifies *"Automatic" Sprinkler's* leadership in the science of fire protection.
2. *"Automatic" Sprinkler* devices and systems are designed to the individual requirements of business, commercial and industrial alike, and are approved by all leading insurance authorities.
3. *"Talking over"* the safety and investment advantages of *"Automatic" Sprinklers* involves no obligation on your part and surveys and estimates are cheerfully furnished without cost or obligation.

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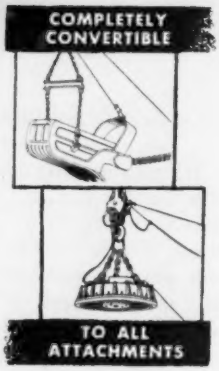

UNIT 1520 can be equipped with retractable high A-Frame to permit capacity loads on extended boom at long radius.

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A 5413-2/3CA

Refractories

(*Continued from Page 90*)

oxides, are used occasionally. Magnesite nozzles are frequently employed for highly erosive steels.

Runner brick are made from fireclay of the same general quality as that used in sleeves and nozzles. They require good workmanship to insure proper fitting and satisfactory resistance to spalling, cracking and erosion.

Acid resisting brick, made from carefully selected special clays, are fired in such a way that a dense, vitreous, nonabsorbent structure is produced. Their structure makes them highly resistant to the action of acids and alkalies (except hydrofluoric and boiling phosphoric acids). They are, however, susceptible to spalling when subjected to thermal shock.

Insulating firebrick — the ASTM standard classification for insulating firebrick contains six groups as shown in the accompanying table.

Primary function of insulating firebrick is to reduce heat loss through furnace linings. Their porosity, ranging from 65 to 85 per cent, gives them extremely low thermal conductivity. Most common method of obtaining this porosity is to burn out during manufacture a combustible material, such as cork or sawdust, that has been molded with the clay. Crushing strength of these brick varies from about 100 to approximately 800 psi.

These lightweight, porous refractories store less heat and often save up to 80 per cent of the heat ordinarily lost through uninsulated furnace walls. Furnaces built with insulating firebrick may be brought to operating temperatures in 80 to 90 per cent less time than furnaces of heavy firebrick construction. Rapid heating and cooling cycles thus made possible in batch or intermittent type operations insure fast production and reduced labor charges. Other advantages are thinner linings, lighter weight construction and simpler design.

Because of their porosity, insulating firebrick naturally have less resistance to slag, abrasion and spalling than do ordinary high duty firebrick.

High Temperature Bonding Mortars Discussed — Fireclay mortars, used for laying up and coating fireclay brickwork of all types, increase the brick's life by eliminating open joints and protecting the refractory surfaces. Composition of a mortar should be similar to that of the brick with which it is used. Heat-setting mortars are more refractory, but air-setting mortars are generally favored

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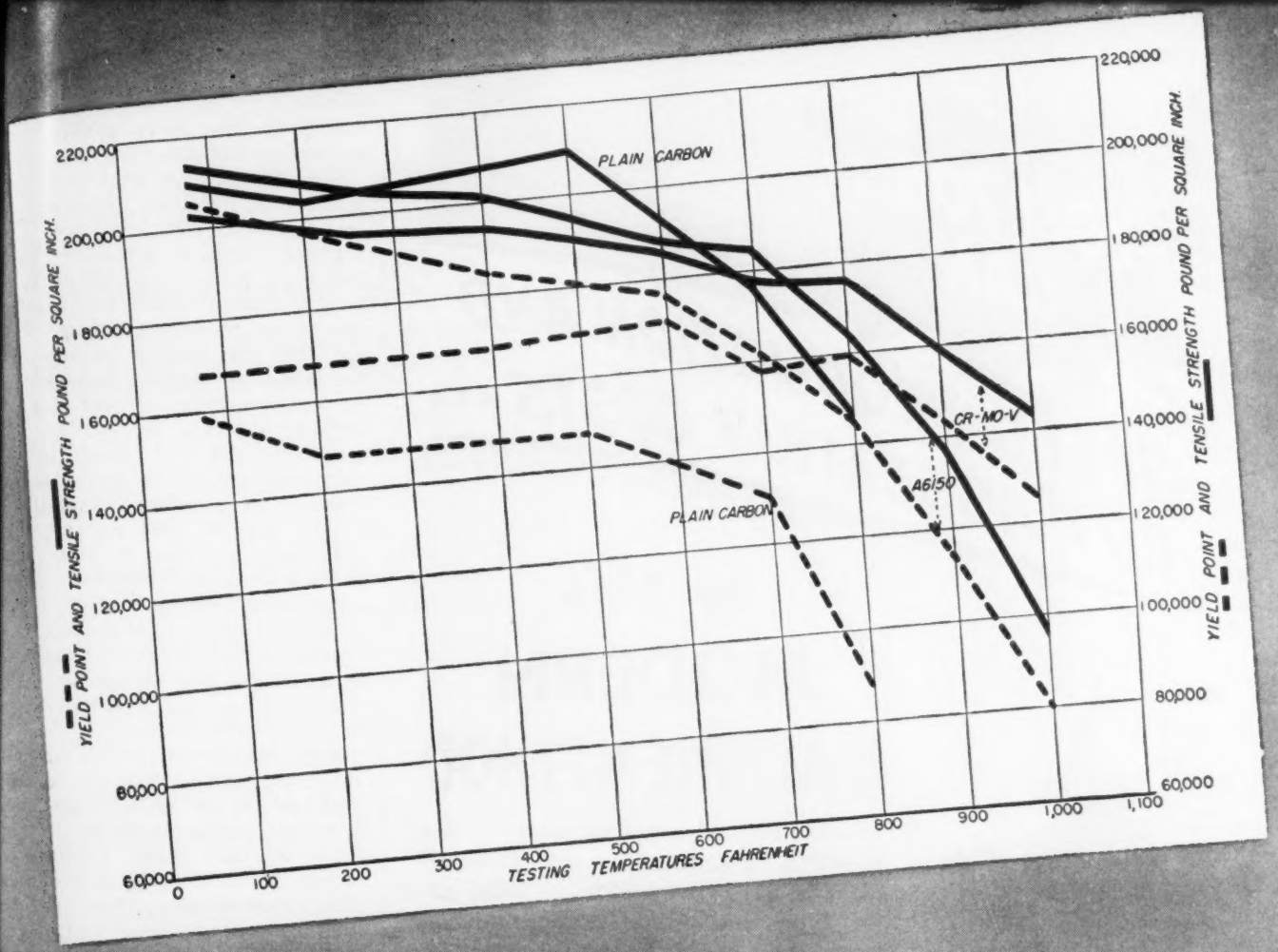

HIGH TEMPERATURE PROPERTIES

of Cr-V and Cr-Mo-V Spring Steels

SPRINGS FOR SERVICE at elevated temperatures require steels which resist softening and lowering of the yield point. Unless hardness and yield strength are stabilized by correct alloy additions to the steel, these properties deteriorate rapidly as the temperature is raised.

The chart above shows the yield point and tensile strength of three types of spring steel at elevated temperatures determined by standard short-time tension tests.

Springs of plain carbon steel are sometimes used at moderately elevated temperatures, although their lower yield values prevent them from giving service as satisfactory as that of the alloy spring steels.

Chromium-vanadium steel springs, such as AISI 6150, give better service at ordinary temperatures because of the higher yield point. In addition, they may be used at operating temperatures up to about 700° or 750° F because they retain high yield point values as the temperature is increased.

Chromium-molybdenum-vanadium steel was especially designed for springs operating at temperatures in excess of 750° F. It can be used for springs operating at temperatures as high as 850° F or even higher under some conditions. At 800° F, the yield point of this steel is still greater than that of plain carbon steel at room temperature.

If you have a problem in spring applications at elevated temperatures, our metallurgical engineers will be glad to help you solve it.

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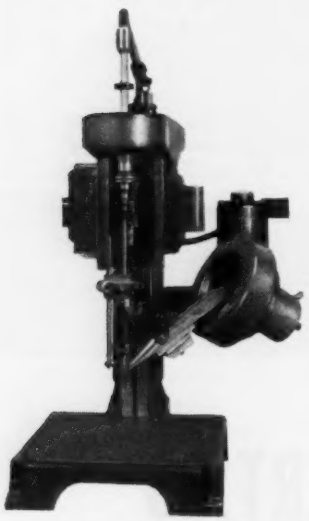

Model A—Bench Type

Thousands of manufacturers are profiting by the use of DETROIT POWER SCREWDRIVERS . . . They offer time and labor saving advantages too great to be overlooked. They will drive screws as fast as one a second! . . . . Machine, wood, brass, self-tapping sheet metal screws standard heads, special heads.

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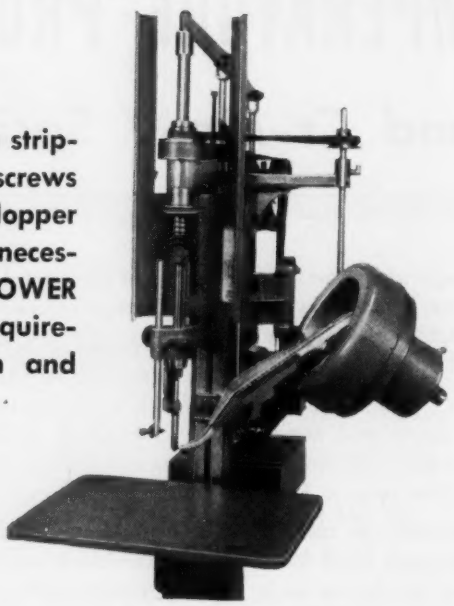

Model B—Pedestal Type

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because they bond walls more firmly during the heating-up period. Air-setting mortars cost more than heat-setting types and are often used when heat-setting mortars would give better service results.

Plastic fireclay refractories are premixed, heat-setting refractory batches shipped ready for installation by low-pressure ramming. They are used in making repairs and for monolithic furnace linings, walls or sections. They are also used for molding intricate shapes. Regular plastic firebrick is comparable to high duty fireclay brick in quality and is suitable for operating temperatures up to 2900° F. The super plastic grade is comparable to super duty fireclay brick and withstands working temperatures up to 3100° F.

Castable fireclay refractories have chemical characteristics essentially the same as those of fireclay brick. They require no prefiring before being placed in service.

High alumina refractories are classified, according to their alumina content, as 50, 60 and 70 per cent. Limited quantities of an 80 per cent grade are also made. Diaspore or bauxite forms the base of most high alumina refractories. These brick resist higher temperatures than can suitably be withstood by super duty fireclay brick, and give superior resistance to fluxes such as the oxides of iron, calcium and lead. In general, the higher the alumina content, the greater the resistance to both temperature and fluxing.

Both Sillimanite and Mullite are trade names for the same type of refractory, which is made from highest grade kyanite calcined to form Mullite. Mullite is a relatively stable compound and is a highly desirable constituent of alumina-silica refractories. These brick contain only about 63 per cent alumina, but they are superior even to the 70 per cent alumina-diaspore type of brick in their resistance to load, spalling, temperature, abrasion and lime or alkaline slags.

Synthetic Mullite brick are generally similar to the Sillimanite and Mullite brick made from kyanite, except that they are higher in alumina content. They contain close to the theoretical alumina content of Mullite, which is 71.8 per cent.

Sillimanite high temperature bonding mortars with a wide range of properties are available for bonding and coating all types of alumina-silica brick. Heat-setting Sillimanite mortars are much used for laying up brick in blast furnace linings, mixers and mixer ladles.

Sillimanite plastic, an air-setting

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On thousands of applications in every field of manufacture, stepless variable speed operation assures exactly the right speed for every operation . . . for every operator . . . the right speeds for each change in the consistency or shape of the material being processed. Such variable speed operation pays off in higher rates of production, a more uniform better quality product and more efficient performance of your equipment and your operators.

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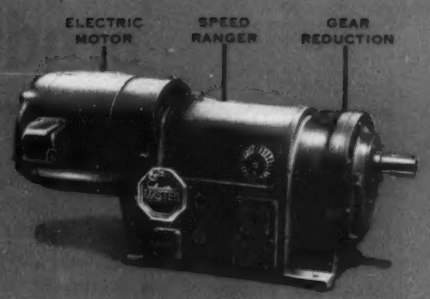

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IT PAYS

Probably you will not need this same combination of features. However, the next time you need a drive for material processing, handling, and conveying equipment; mixers and agitators; welding-positioners; machine tool drives; testing and calibrating equipment . . . to name only a few . . . see what a really remarkable job Master Speedrangers can do for you. Write for Data 7525, new twenty-four page booklet on Speedrangers.

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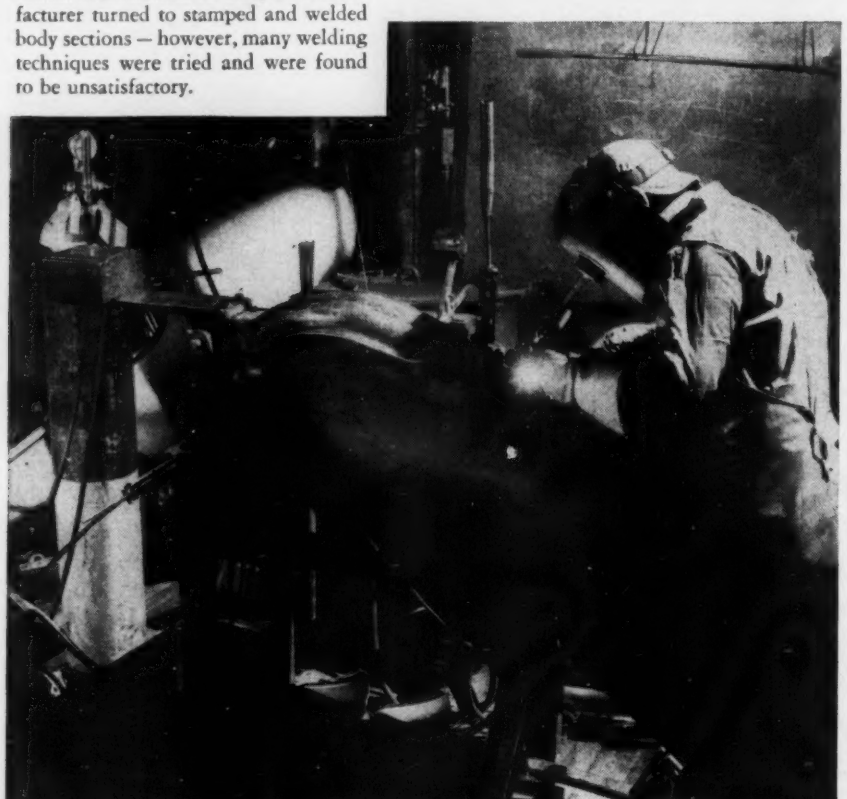
HELIWELDING boosts auto fender production

A prominent automobile manufacturer found it difficult to give sheet metal the deep draw required by new styling. Assemblies such as fenders, drawn from one metal sheet, resulted in distortion and excessive splitting, even when drawn hot. Because of this, the manufacturer turned to stamped and welded body sections — however, many welding techniques were tried and were found to be unsatisfactory.



R. E. Ferris and C. E. Tromp, Airco representatives, were consulted, and recommended Airco's Heliwelding processing. It proved most practical, both from the speed and finishing standpoint — there was no distortion of the .042″ sheet metal used. The photograph illustrates the Heliwelding of two stampings of the fender at a speed of 13″ per minute, using Airco No. 1 Alloy Rod to insure freedom from porosity and pinholes in the weld metal.

• • •

If you are interested in applying the Heliwelding process to a particular fabrication problem of your own, you will find some helpful hints contained in the pages of Bulletin ADC-709. Please address your nearest Airco office for a copy.

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kyanite-base refractory material, is used for monolithic sections, also for patching fireclay, high alumina and Sillimanite brickwork. It has excellent volume stability and good resistance to attack from hot metal and slags. It is available in various consistencies.

Used For Spall-Resistant Roofs— Sillimanite ramming mixes, a number of which are available, have a base of calcined kyanite. The coarse-grained, heat-setting mixes are designed for forming large monolithic sections, such as pads in blast furnace bottoms as well as spall-resistant roofs of small electric arc furnaces. Medium-grain, heat-setting mixes are used for patching and for forming medium-size sections, such as Ajax electric furnace linings. Medium-grain, air-setting mixes are also available. Fine-grain mixes for forming small sections and making thin patches on brickwork are supplied with either heat-setting or air-setting properties.

Advantages of Sillimanite refractories—high refractoriness, good volume stability and excellent spall resistance—are obtainable in Sillimanite castable, a hydraulic-setting product requiring no preheating.

Fused alumina is produced by heating bauxite ore together with purifying agents in an electric furnace to the fusion point of bauxite. The resultant material is then crushed, graded and bonded to form several grades of refractories. Alumina contents of approximately 85, 90 and 99 per cent-plus are available.

Fused alumina refractories are characterized by great refractoriness, high resistance to load, good resistance to most slags, and thermal conductivity intermediate between fireclay and silicon carbide. They may be used in combination with fused magnesia for linings of indirect arc furnaces and for crucibles in high-frequency coreless induction furnaces. The most widely used type is the 90 per cent grade. This product has approximately three times the thermal conductivity of fireclay brick. It is used in structures when silicon carbide cannot be employed for chemical reasons, but where good thermal conductivity is desired. The 99 per cent-plus grade has been used with success in applications involving atmospheres very high in hydrogen at temperatures approximating 3100° F.

Electrocast high alumina refractories are formed by fusing refractory oxides in electric furnaces and pouring the melt into molds. The group includes cast Mullite and other compositions containing from 80 to 99 per cent alumina. All refractories of

this type are homogeneous, predominantly crystalline, substantially impermeable and in general, resistant to abrasion at high temperatures as well as to the attack of most fluxes, slags and gases. Some of them are also quite resistant to cracking and spalling.

(To be continued)

Electric Plant Catalogs

GASOLINE and diesel-driven electric plants are covered in two new bulletins available from D. W. Onan & Sons Inc., Minneapolis, Minn. Eight-page folder A-168 is devoted to the line of gasoline-driven electric plants ranging from 260 to 35,000 watts in all standard voltages, frequencies and phases. Also listed are direct current models, battery charging electric plants and special accessories.

Models ranging from single cylinder, 2500-watt air-cooled units to 6-cylinder 60,000-watt water-cooled plants are covered in diesel folder A-192. All are listed with standard voltages, frequencies and phases. Catalog information concerning parallel operation, automatic controls, optional equipment and choice of models.

Color Metallography

LATEST thoughts and practices in the field of color metallography are presented in printed form by American Society for Testing Materials, Philadelphia. Special technical publication No. 86 is devoted to papers presented at a symposium presented at a recent ASTM meeting. Described are some of the fundamental requirements of the microscope, techniques of photography involved and other information which may be used in the field. The book is illustrated with ten color plates.

Relates Company History

EARLY struggles after founding in 1913 to its present position in the field of stamping is covered in an illustrated brochure prepared by Motors Metal Mfg. Co., Detroit. Pictures show how the company is equipped to serve its customers from the designing board through the shipping department. Included are photographs of many of the company's departments, and products made.

Chemical Resistant Coatings

INFORMATION on chemical coatings for maximum chemical, moisture and rust resistance, for all metal, concrete and wood, is available in a four page folder from Wilbur & Williams Co., Boston.

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Mr. J. L. Fetes, Foundry Superintendent

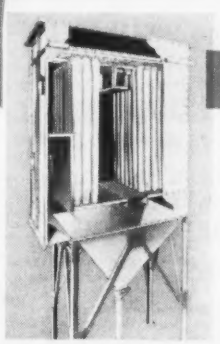
"When I came to this foundry, I was very happy to discover that all cleaning and grinding operations were being ventilated with a Dustube Dust Collector. My experience with these units in other foundries has been exceptionally good in terms of efficiency and cost-saving performance. The simple, practical design of the Dustube provides the highest efficiency at the lowest possible cost."

Mr. W. J. Cameron, Mechanical Superintendent

"The Dustube Dust Collector has been a profitable investment from every standpoint. We benefit in a business way through employee good will and their freedom from worry of dusty conditions far beyond the small amount invested in the collector. The Dustube is a simple and compact unit providing dependable, economical performance."

Mr. Alfred Briard, Maintenance Foreman

"Our Dustube Dust Collector operates so quietly and efficiently that the only attention it has required is periodic inspections. These are fast and simple since all work is on the clean air side of the collector. Maintenance is at a minimum because the tubes are never under tension, and never in contact with abrading or corrosive metal."



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Oxygen in Metals

(*Concluded from Page* 82)

Under ideal conditions the blanks are low (0.01 to 0.02 cc per hour at N.T.P.) corresponding to about 0.0002 per cent oxygen for a 10-minute analysis of a 1-gram sample. Two factors which contribute to low blanks are (a) flaming of the apparatus with a bunsen burner without dry ice or liquid air on the traps (do not operate pumps (D)) and (b) high temperature, long-time outgassing of the crucible.

Calculation of Oxygen Content— The mercury level in the right hand tube of cutoff No. 7 can be adjusted to any one of four marks on the tube, which correspond to four volumes calibrated, so that 1 mm Hg pressure of CO_2 corresponds to 0.001, 0.002, 0.010 and 0.02 mg respectively. Since half of this oxygen comes from the catalyst, each mm of Hg pressure read correponds (for a 1-gm sample) to 0.00005, 0.0001, 0.0005 and 0.001 per cent oxygen. The sensitivity and ranges are adequate for most samples.

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Describes Auger Bits

AUGER bits for electric drills, made by Midway Tool Co., Inc., Melvin, O., are described in detail in a recently released catalog. Thirteen individual bits are listed with full specifications.

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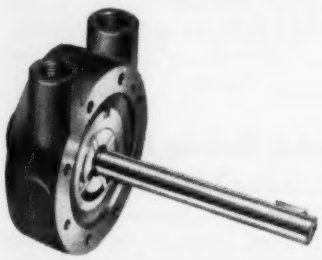

Stripped Models with Housings, Nos. 8022, 8062 and 8102. Simplify installation, particularly where internal discharge and suction ports are not readily incorporated in the machine design, or where outside piping is desirable.

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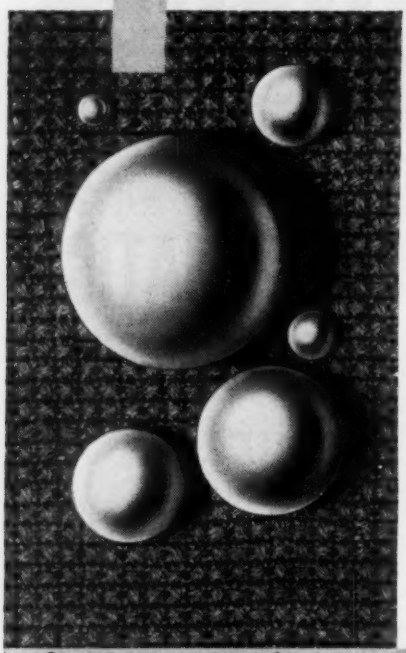

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SNAGGING

Get on with production. Do your snagging quicker, cleaner, *safer!* With Electro HIGH SPEED SNAGGING WHEELS *engineered to your job,* you'll see costs come down and volume of *better output* go up. These wheels work *on* anything *from* anything—swing frames, floor stands or portable machines. Full details illustrated in full color in our new Grinding Wheel Manual No. 645. Send for it *now.* It's *free.*

Service from Los Angeles or Buffalo

Electro SINCE 1919

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Electro REFRACTORIES & ALLOYS CORPORATION
Mfrs. • Refractories • (High Speed Grinding Wheels) • Crucibles • Alloys
344 DELAWARE AVE. BUFFALO 2, N. Y.

Patent Index Established

INFORMATION on more than 12,000 United States patents on welding has been made more easily available to industry and educational institutions by a patent classification index established at Ohio State University, Columbus. Kept up by the Department of Welding Engineering as part of the A. F. Davis Welding Library, the index classifies each patent in several different ways: By process, material, product, use, inventor's name, date of issue, etc. Information is contained on key sort cards which are sorted mechanically.

Patents themselves are divided into 19 groups by procedure, equipment, accessories, and industries. Index covers not only the fundamental patents on welding processes and equipment but also the important field of industrial applications of the welding processes. Use of the patent classification system is offered to industrial organizations, individuals and educational institutions.

Faster Perforating

BULLETIN No. 7 of Wales-Strippit Corp., North Tonawanda, N. Y., describes and illustrates latest Wales hole system for faster and more economical perforating and notching of sheet products. It shows how the units are set up in unlimited patterns and put into operation in the production of television, radar and radio chassis.

Wooden Bearing Manual

APPLICATION of wood bearings to heavy machine design in situations where other types of bearings might not serve as efficiently is considered in an engineering manual published by Paramount Oilless Bearing Co., Worcester, Mass. Typical of these situations are machinery in which oil drip and spatter would mar the product, outdoor marine installations where weather, salt and other corrosive factors impair effectiveness, where conditions of shock demand a resilient material and use in locations of difficult access where bearings must remain self-lubricating for long periods. Manual is being loaned to engineers and machine designers on request.

Masonry Drilling Simplified

WITHDRAWING masonry drills to remove dust from the hole is eliminated by the application of high tensile wire to form a "live-spiral" flute on the shank of the drill. A development of Carboloy Co. Inc., Detroit, the drill is said to cut faster

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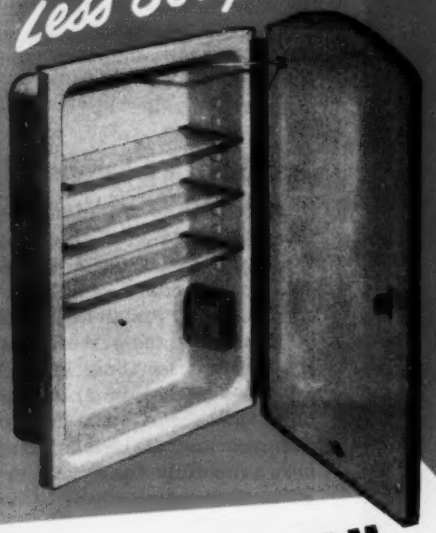
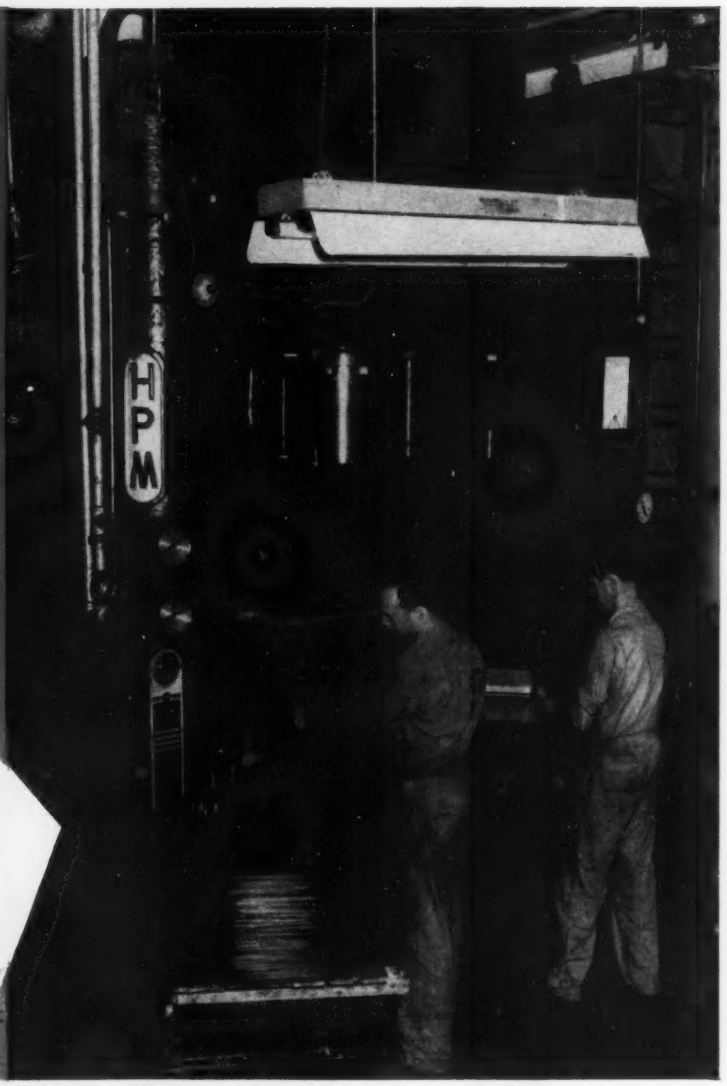
High Quality Parts!

Less Scrap Loss!





DRAW-TRIM-FORM RETURN FLANGE...ALL DONE IN A SINGLE PRESS STROKE!

Another H-P-M Production Record!

When F. H. Lawson Company installed an H-P-M deep drawing press to take over the production of bathroom cabinet bodies, three important things happened.

1. **One press replaced two—eliminating costly material handling time.**
2. **Substantial reduction in scrap.**
3. **Improved product quality without sacrifice of rapid production rate . . . . six cabinet bodies per minute!**

Here again is a typical example of how H-P-M's all-hydraulic operation, fast cycle and automatic control are making money for many prominent manufacturers.

Call in a nearby H-P-M Engineer and have him show you how H-P-Ms can do the same for you.

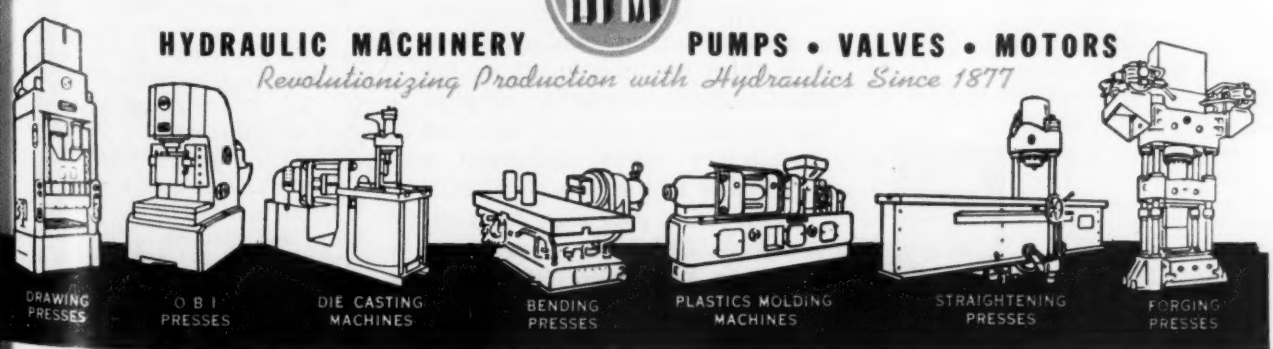
THE HYDRAULIC PRESS MFG. CO. - 1044 Marion Rd., Mount Gilead, O., U.S.A.

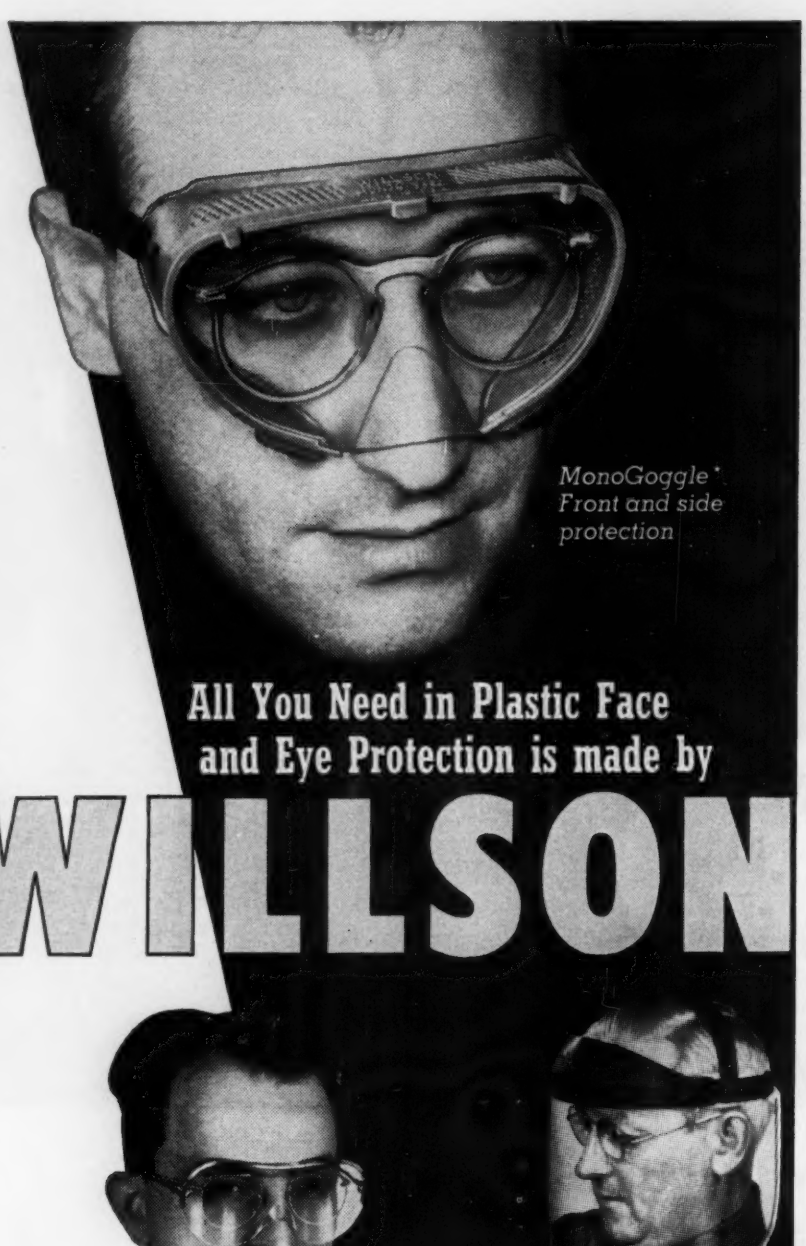
Read the Lawson story recently published in STEEL. Write today for a reprint.

HPM

HYDRAULIC MACHINERY **PUMPS • VALVES • MOTORS**

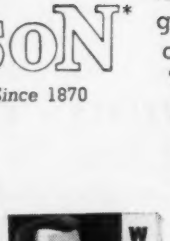
Revolutionizing Production with Hydraulics Since 1877





WILLSON*
Dependable Products Since 1870

These three types of protective devices, all with one-piece plastic lenses or visors and each with many variations, give you a wide selection to meet specific requirements of work hazards. Their light weight and comfortable fit insure workers' willingness to wear them for long hours on the job. Complete information on plastic protection and other eye and respiratory safety equipment is available in the new WILLSON catalog. Get your copy from our nearest distributor or write direct to WILLSON PRODUCTS, INC., 233 Washington Street, Reading, Pa.



*T.M. Reg. U.S. Pat. Off.

and keep on drilling deeper with greater ease.

Wire is solidly attached to the shank at lower and upper ends, being wound around the shank in a low-spiral helix. Pressure required on the drill is said to be no greater at the end of the deep hole than at the start. They fit any rotary drill, drill press or hand brace and are offered in ten diameter sizes ranging from ½ to 1 inch. Three kits are also available.

500 Standard Samples

PREPARED, certified and distributed by National Bureau of Standards, Washington, D. C., are nearly 500 different standard samples of chemicals, metals, ores and ceramics. Used by analytical and research laboratories for use in controlling chemical processes and in maintaining equipment and apparatus accuracy, the samples are materials which have been carefully analyzed or whose physical properties have been precisely determined.

Some of the samples are certified for chemical composition, while others are certified with respect to a specific chemical or physical constant—for example, melting point, viscosity, index of refraction, heat of combustion or other properties. New standards are added continuously to meet increasing requirements; samples of radioactive carbon 14 have just been made available.

The first standards were prepared in 1905, when the American Foundrymens' Association turned over to the bureau its four sets of standardized pig iron samples. During the past year, about 22,000 standard samples were issued to users in this country and abroad. In general, they are employed to check and maintain the accuracy of many instruments, such as calorimeters for gas and coal tests and pyrometers used in annealing steel.

Designing with Extrusions

ABILITY to use extruded aluminum shapes effectively may come as a result of using the basic engineering principles noted in the book, *Designing with Aluminum Extrusions*, published by Reynolds Metals Co., Louisville, Ky. The 138-page book breaks down the advantages of the extrusion process into eight principles of design, each of which is then illustrated and explained in detail by use of diagrams, charts and pictures of actual parts.

Characteristics of aluminum itself, the selection of the correct alloy and temper, fabricating properties, finishes and cost factors are also

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covered as separate chapters. A tabular section presents 16 tables of data on chemical, mechanical and physical properties and extrusion process data such as minimum thicknesses, maximum lengths, tolerances, difficulty factors, etc.

Reveals Metal-Ceramics

HIGH thermal shock resistance, high strength at elevated temperatures and good abrasion resistance are characteristics of metal-ceramic material—a mixture of metals and ceramics—announced by P. R. Mallory & Co. Inc., Indianapolis, Ind. Also said to have intermediate electrical and thermal conductivity, the new material is machinable and suitable for electroplating.

Possible uses are said to include dies for hot forming, containers for high temperature furnace work, jet engine and rocket components, flux resistance welding and brazing fixtures, electrical contacts, and spark plug electrodes. The company reports that it is possible to incorporate a dense metal at one end and metal ceramic at the other end.

One-Man Fire Department

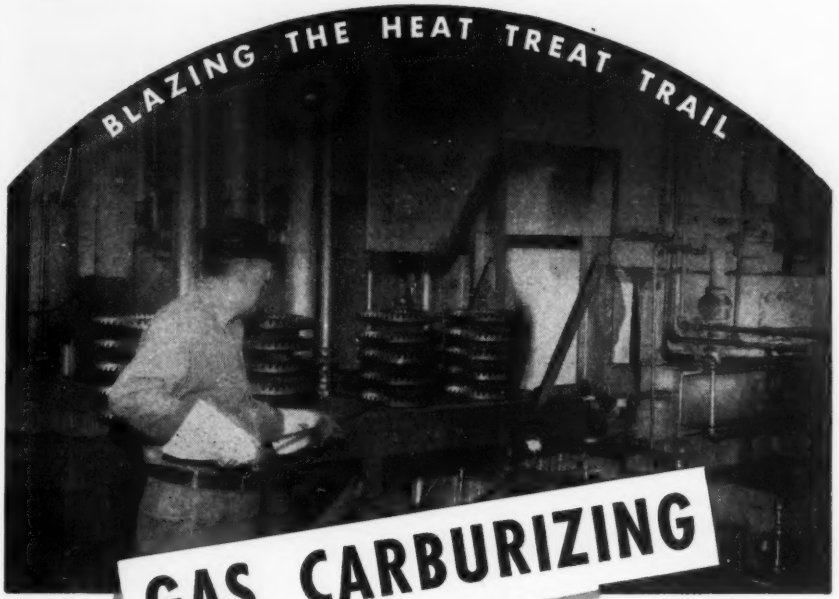
LARGE stationary fire fighting units, developed by Ansul Chemical Co., Marinette, Wis., enable one employee, such as a night watchman, to fight a fire in any portion of an area which may be several acres in size. Units are being built in 500, 1000 and 2000-pounds capacities for the protection of wide areas where a minimum of manpower is available.

Stationary unit itself consists of a centrally located steel tank containing dry chemical and nitrogen cylinders, the latter used to pressurize the tank. Piping is run underground from the tank to one or more hose houses. Rate of flow of dry chemical is 450 pounds per minute. The problem of recoil at this high rate of discharge is said to be minimized by a specially designed nozzle which has effective range of about 35 feet.

Offers Tap Sharpening Service

IN ORDER to permit industries to get the full value out of precision ground thread taps, Edward Blake Co. of West Newton, Mass., is establishing a tap servicing department. Function will be to provide a place where the small firm can obtain service of the same type that larger firms get by purchasing the company's tap sharpening machine.

Company feels that a correctly sharpened tap gives the greatest accuracy because it has accurately in-



Developed by *Holcroft* in 1935 for

MORE ACCURATE, LOWER-COST CASE HARDENING

HOLCROFT engineers established the basic principle on which *all* modern gas carburizing furnaces operate—namely, that in order to control the process, a non-decarburizing gas must be used to dilute the hydrocarbon gases which supply the carbon for carburizing. In order to *apply* this principle, Holcroft & Company in 1935 designed and built a generator to produce such a diluting gas.

This patented development—resulting from original Holcroft research—brought all the advantages of today's gas carburizing process. These include (1) accurate control of case depth and carbon content; (2) exceptionally clean, soot-free work; (3) a notable increase in furnace alloy and tray life; and (4) greater output with much less labor. Because of these advantages, gas carburizing is rapidly replacing pack carburizing throughout industry.

Further details on the process are given in the Holcroft Gas Carburizing bulletin, available on request.

The Holcroft engineering leadership which developed gas carburizing is available to serve YOU in production heat treat work of every kind. And remember—Holcroft offers you COMPLETE METALLURGICAL AND ENGINEERING SERVICE, from designing the furnace to your individual needs through the trial run in your plant. We invite your inquiries.

SINCE 1916 *Holcroft* AND COMPANY

BUILT BY HOLCROFT & COMPANY DETROIT-MICH.

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

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WALKERVILLE, ONTARIO

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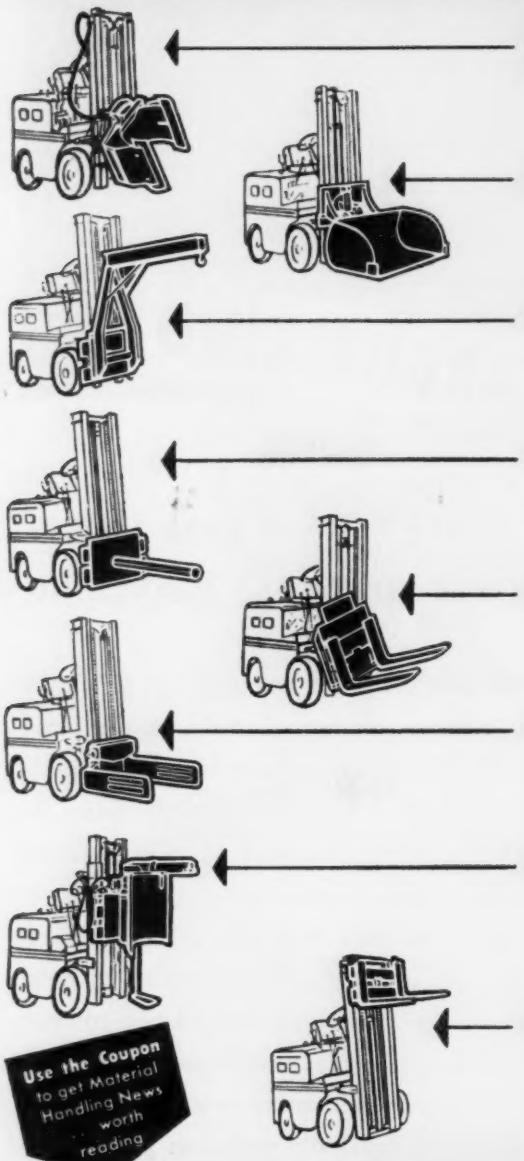
R. E. McARDLE
5724 NAVIGATION BLVD.

CLARK Attachments

MAKE THE CLARK FORK TRUCK "MANY MACHINES IN ONE"



ROTATING ROLL CLAMP
Picks up a roll in either horizontal or vertical position and rotates it to the other

SHOVEL
For easy pick-up and dumping of sand, cinders, gravel, coal, aggregate and other bulk material

CRANE
For handling many large, unwieldy items unsuitable for forks and pallets; usually used with a chain

RAM
Handles coiled material, spools, castings and many fabricated units with openings to admit the ram

ROTATING FORKS
For handling and dumping special containers filled with scrap, bulk material and similar loads

CLAMP LIFT
For handling a tier of boxes or cases, by gripping the bottom unit firmly between clamping arms

BARTEL DEVICE
For handling paper rolls—a core pin, hydraulically actuated, enters the top of the roll, and holds roll securely against a curved clamp-plate

HI-LO-STACK
Free lift of more than 5 feet without increasing overall height; more than average tiering height and low clearance height

Use the Coupon to get Material Handling News worth reading

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 26, MICH.

Please send the items checked . . . without obligation ☐ Condensed Catalog ☐ Material Handling News

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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

dexed cutting edges, uniform and correct rake angle for the cutting teeth and uniformly relieved chamfers. With the equipment used by the company, all of these points are carefully controlled.

Tank Practice Submitted

SUBMISSION of simplified practice recommendation R8-47, ferrous range boilers, expansion tanks and solar tanks, to producers, distributors and users is announced by National Bureau of Standards, Washington, D. C. This revision lists two additional sizes of expansion tanks and gages of metal for the shell for range boilers and expansion tanks. It is being sent out for acceptance or comment.

Like Stainless-Like Spring

These words sum up a new precipitation - hardening stainless steel to see wide use

CORROSION resistance closely approaching that of 18-8 stainless and strength and hardness matching high carbon spring steels is provided by a new precipitation-hardening stainless steel developed by Armco Steel Corp., Middletown, O. Besides having the excellent corrosion resistance high strength and hardness, the new steel, designated as Armco 17-7 PH, has good elastic properties, fabricating flexibility and low-temperature hardenability.

It is expected to see wide use in chemical, petroleum, and food producing industries for springs, pressure tanks, diaphragms and disks, conveyor parts, spring clips, and similar parts. The high strength and corrosion resistance factors are expected to make it suitable for aircraft and automotive industry uses. The stainless alloy is available in soft temper strip, sheet and plates, hard temper sheet and strip and hard temper and extra hard temper wire forms.

In the soft temper condition, it may be severely formed or drawn and welded by resistance, metallic-arc, and inert gas shielded-arc methods. After fabrication, its full strength and hardness are developed by heating at 1400° F for 30 minutes, air cooling, and then heating to 900-950° F for 30 minutes, followed by air or furnace cooling. Soft temper when fully hardened are said to have a tensile strength in the range of 185-205,000 psi, a yield strength of 160-190,000 psi and a hardness of Rockwell C40-45.

Hard temper wire may be wrapped on its own diameter, giving an indi-

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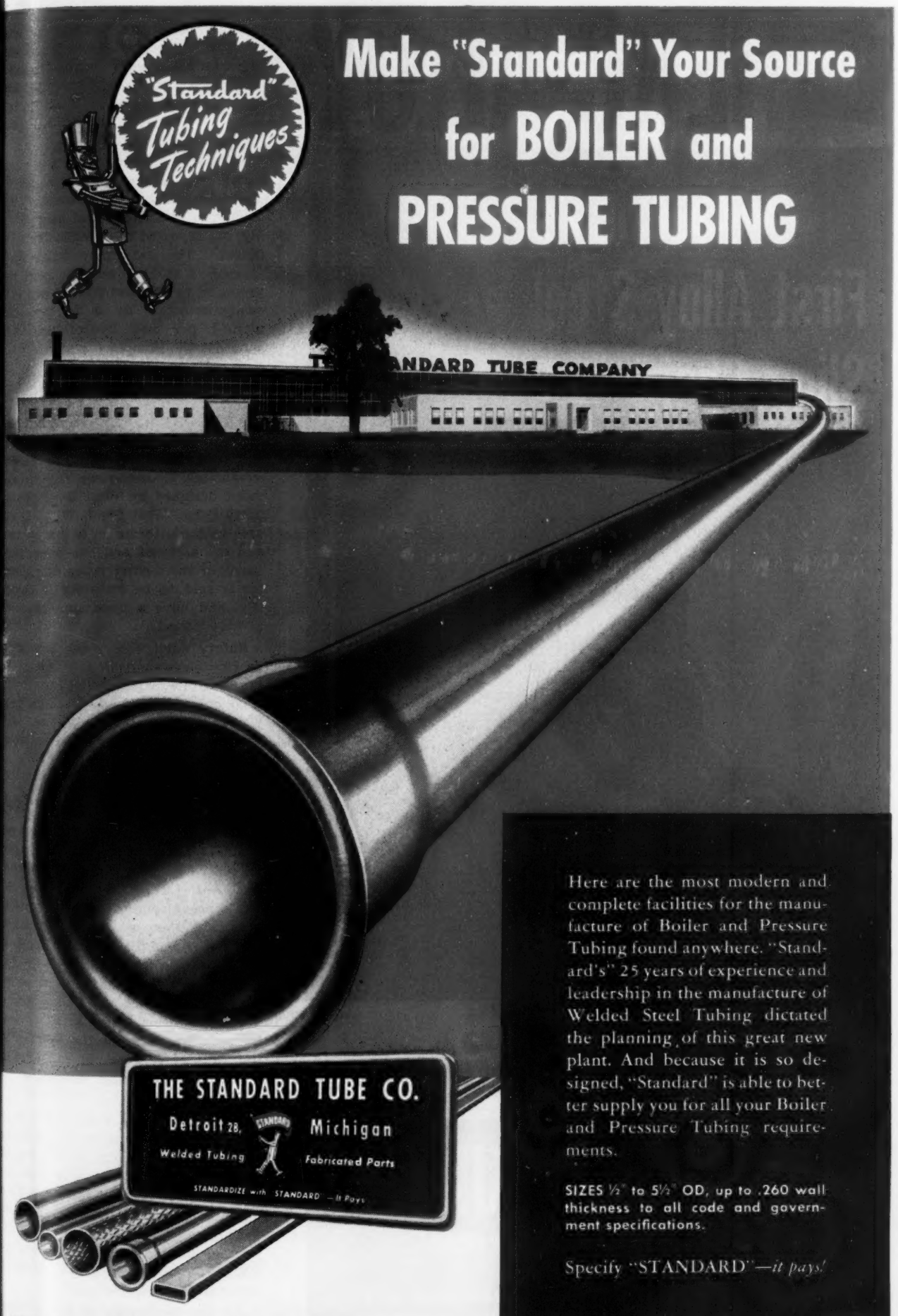

"Standard" Tubing Techniques
Make "Standard" Your Source for BOILER and PRESSURE TUBING
ANDARD TUBE COMPANY
THE STANDARD TUBE CO.
Detroit 28, Michigan
Welded Tubing
Fabricated Parts
STANDARDIZE with STANDARD — It Pays

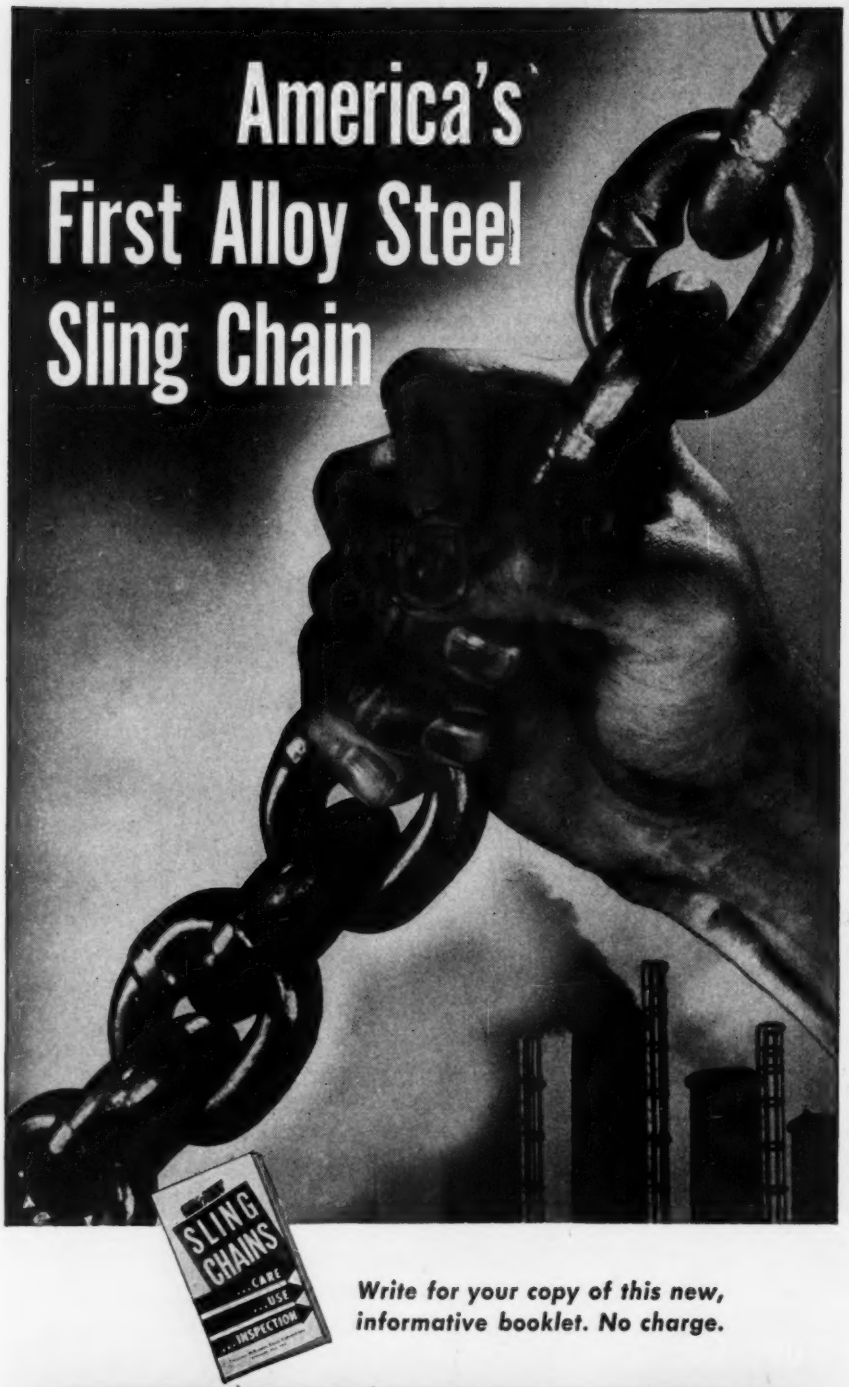
Here are the most modern and complete facilities for the manufacture of Boiler and Pressure Tubing found anywhere. "Standard's" 25 years of experience and leadership in the manufacture of Welded Steel Tubing dictated the planning of this great new plant. And because it is so designed, "Standard" is able to better supply you for all your Boiler and Pressure Tubing requirements.

SIZES ½" to 5½" OD, up to .260 wall thickness to all code and government specifications.

Specify "STANDARD"—*it pays!*

MECHANICAL • STAINLESS • RIGIDIZED • BOILER AND PRESSURE • SPECIAL SHAPES

CM HERC-ALLOY



Write for your copy of this new, informative booklet. No charge.

COLUMBUS-McKINNON
CHAIN CORPORATION

(Affiliated with Chisholm-Moore Hoist Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
SALES OFFICES: NEW YORK, CHICAGO, CLEVELAND AND SAN FRANCISCO

cation of the adaptability to the manufacture of spring and spring wire products. Properties of the wire after hardening are: Tensile strength, 260-345,000 psi, yield strength, 250-340,000 psi, proportional limit in torsion, 150-180,000 psi and Rockwell hardness of C50 and up.

Hardening process is not only simple and economical, but cracking, distortion and decarburization, encountered in conventional heat treating, are reported to be virtually eliminated. The extremely light scale formed at 1400° F and the heat tint produced at 850 and 900° F are both easily removed by a 10 per cent nitric-1 per cent hydrofluoric acid solution, the company states.

Elevator Is Self-Contained

REQUIRING no extensive building alterations, overhead beams, extra supports or a penthouse, is a self-supporting floor-to-floor freight elevator designed by West Bend Equipment Corp., West Bend, Wis. Available with platforms up to 8 x 10 feet, and in basement and one floor, two-story, or three-story types, the elevator is said to be foolproof in operation and have a maximum capacity of 4000 pounds.

Safety devices to meet any state or city elevator code are said to be part of its equipment. Elevators need only a pit, floor openings, provision for doors, or gates on each floor as requirements for the complete installation.

Better Plating—Yet Lower Cost

BETTER method of preparing the steel stamping for protective and decorative plating has allowed Electric Auto-Lite Co., Sharonville, O., to improve bumper quality, while producing them at a lower cost and in greater quantity. In the past, it has been the practice to form the bumper parts to shape, then polish the surface with specially shaped abrasive wheels on a series of machines. Evolution of the bumper to its present degree of complexity made this polishing operation increasingly costly.

Prepolishing the steel while it is a flat sheet is the alternative method developed by the bumper division of the company. A coating is then applied to protect the finished surface against oxidation, handling and die galling scratches. A further advantage of this method is said to result in the decreased die maintenance requirements.

At the beginning of the production cycle, low carbon, high-tensile

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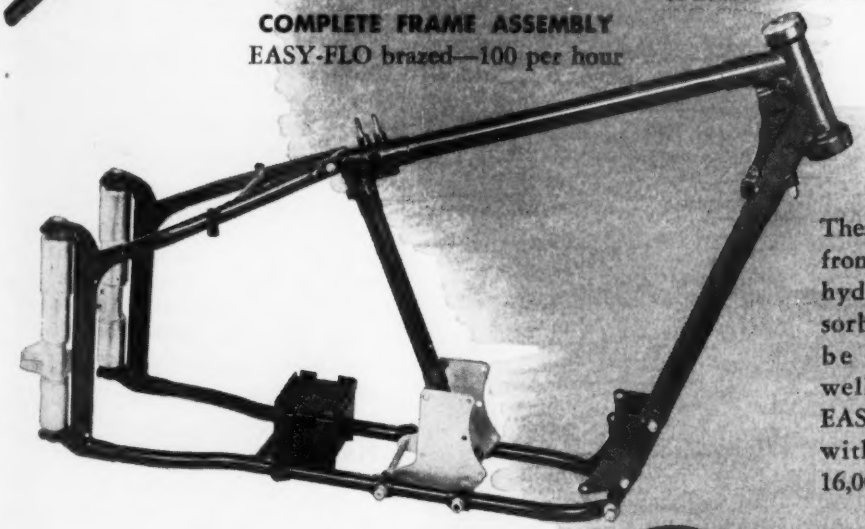
EASY-FLO adds cost-cutting strength to the new Indian lightweight frame

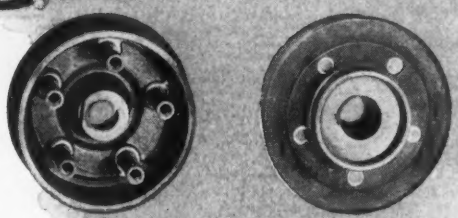
HANDLEBAR
EASY-FLO brazed in approximately 40 seconds

Indian Motorcycle Co. is one of many manufacturers who have found—(1) that EASY-FLO brazed construction satisfies all strength requirements—(2) that EASY-FLO brazing is naturally fast and economical—(3) that production can be stepped up to any required volume by using a fast heating method and a set-up that includes preplacing the alloy—(4) that far less finishing is required. Parts pictured are from the 1950 lightweight model. Tubing is AISI 4130 chrome-molybdenum steel. All tubular joints are induction brazed with rings of EASY-FLO wire preplaced.

COMPLETE FRAME ASSEMBLY
EASY-FLO brazed—100 per hour



FORK TUBES
These tubes form the front fork and act as hydraulic shock absorbers. Joints must be leak-tight as well as strong. The EASY-FLO joint has withstood a load of 16,000 pounds.



CLUTCH DRIVER
Studs are EASY-FLO brazed, 30 drivers per hour, 5 studs each. Front and back views show complete EASY-FLO penetration.

WHAT WILL EASY-FLO BRAZING DO FOR YOU? If you join metals—ferrous or non-ferrous—it is fairly certain that EASY-FLO low temperature silver alloy brazing will speed up production and cut costs on part or all of this work. To find out where and how, write or call and ask us to send a service engineer. He'll demonstrate EASY-FLO brazing and discuss its application to your work. There's no obligation to you for this service.

BULLETINS 12-A, 15 AND 17 will give you EASY-FLO facts in print. Write for copies today.

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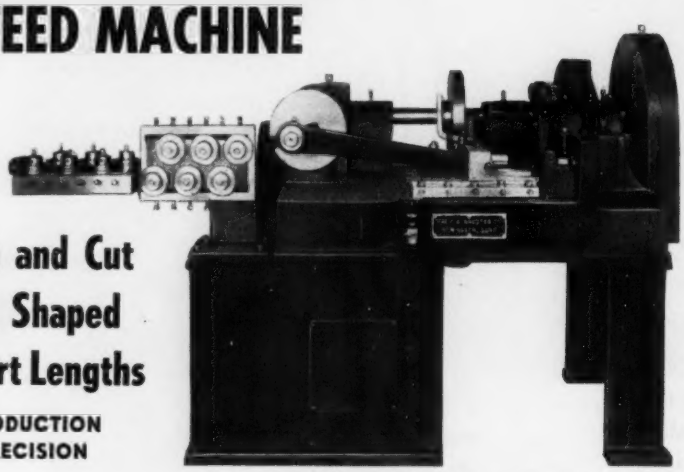
IF IT'S IRON OR STEEL

REMEMBER
to have it
HOT DIP GALVANIZED
(DIPPED IN MOLTEN ZINC)

"Hot-Dip" means actually dipping the steel in a tank of molten zinc. No other method of galvanizing will provide the fusion of metals and perfect seal necessary for effective rust prevention. You are assured a Hot-Dip Galvanizing job of the highest quality when you send your materials to a member of the American Hot Dip Galvanizers Association. For a list of members, write to the Association's headquarters in the First National Bank Bldg., Pittsburgh 22, Pa.

SHUSTER *Automatic*
SLIDE FEED MACHINE



Straighten and Cut
Round or Shaped
Stock, Short Lengths

HIGH PRODUCTION
HIGH PRECISION

Production, 125 pieces per minute.

Recommended wherever accuracy and a perfectly square cut are a "must." In this machine, the stock receives a *shearing cut* from two round dies. This method of cutting produces an accurately square cut and holds the length of cut to very close tolerances.

Capacity: ½" to 10" lengths; maximum diameter of rod, 9/16"; production, 125 pieces per minute. May be had without the 12-roll straightener if your stock is already straightened.

Detailed circulars on request. When writing please describe your set-up.

Mfd. by METTLER MACHINE TOOL, INC.
132R Lawrence St. New Haven, Conn.

Representatives in all principal cities and foreign countries.

steel of drawing quality is supplied by the mill free of dirt and oil. These sheets are passed through a multiple-head, flat polishing machine in which abrasive belts, successively decreasing in grain size, remove surface irregularities in the steel. The average metal removal is small, the quantity depending upon conditions of the steel and belts.

To protect the finished surface, an immersion coating of phosphates of iron is applied, followed by a coating of drawing lubricant. In this condition, the steel sheets are formed to shape. Although shaped abrasive wheels are being continued for finishing operations, the number has been reduced, together with the time required for finishing.

Bulletin: Dust Suppressor

WET-TYPE Hydro-Clone dust and fume suppressors are covered in two new bulletins published by Whiting Corp., Harvey, Ill. One of the four-page bulletins describes the horizontal type, the other, the vertical type. Both contain cut-away illustrations explaining operation, plus dimension tables for the various sized units and installation photos of units in operation.

Suppressors were developed for foundry use and have been applied to shakeouts, sand-handling and hot blast systems. Recent applications have been wherever dust or fumes make working conditions either uncomfortable or dangerous, the company states.

Has Accurate Holding Power

ONLY two parts receive any wear on the improved cam-type automobile fixture lock and drill jig lock made by Siewek Tool Co., Detroit, for its standard rack and pinion type drill jigs. Available to manufacturers and designers of special holding devices and machinery as a fixture lock, it is said to feature accurate holding power, effectiveness at all points of travel and quick release. Only the two braking shoes receive any wear.

To operate the lock, the downward stroke of the handle motivates the retainer to which it is screwed, bringing springs into contact with the flat sides of the cam and motivating the shaft. When the fixture in which the shaft is attached contacts the work and holding pressure is developed, the general surface of the cam causes the springs to expand, thus driving the braking shoes out against the lock housing and locking the part in place for machine operation.

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NEW!

WELD GRINDING

CLEANING

CUTTING

FINISHING

TRY SIMONDS ABRASIVE CO.

FIBREX® RED WHEELS

TRADE MARK

For EXTRA LONG WHEEL LIFE, versatility, fast cutting, here's your answer . . . Fibrex Red Wheels. They're strong, tough durable for truly outstanding action in heading into welds, removing flash and bead and cleaning up rough ragged surfaces, especially on stainless steel.

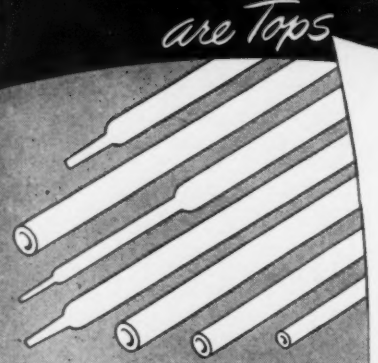
Depressed Center Wheels (with adaptor) for all portable disc sanders and right angle grinders . . . straight wheels for cutting and all purpose grinding with regular equipment. Your choice of grain sizes . . . 16, 24, 36, 50 or 80. Send now for Bulletin ESA 186 giving full details on these new and amazingly versatile abrasive tools.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUE. AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUE.

McDANEL
HIGH TEMPERATURE PORCELAIN COMBUSTION TUBES
are Tops

For Carbon and Sulphur DETERMINATIONS



Every stage of production in the manufacture of McDanel Porcelain Combustion Tubes and Zirco Tubes is carefully controlled to assure outstanding performance in your carbon and sulphur determinations.
Density, bore size, wall thickness, gas tightness, resistance to thermal shock — are all checked before shipment. When you receive your order of McDanel Combustion or Zirco Tubes from your supplier you may have complete confidence in their ability to give unexcelled service.

OTHER McDANEL PRODUCTS

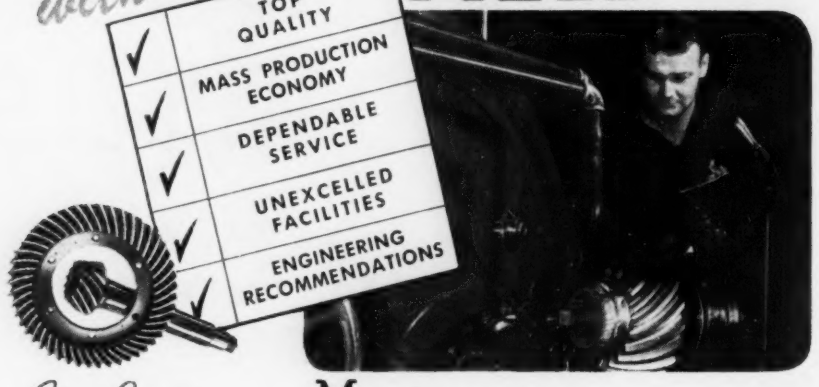
- Non-Spalling, non-blistering, gas tight Combustion Tubes.
- High Temperature Zirco Tubes.
- Self Cooling Combustion Tubes.
- Refractory Porcelain Specialties in stock or made to your specifications for your individual needs.

Specify McDanel High Temperature Porcelain Combustion Tubes and Zirco Tubes from your supplier.

McDANEL
REFRACTORY PORCELAIN CO.
BEAVER FALLS, PA.

Check with FAIRFIELD for FINE GEARS

- ✓ TOP QUALITY
- ✓ MASS PRODUCTION ECONOMY
- ✓ DEPENDABLE SERVICE
- ✓ UNEXCELLED FACILITIES
- ✓ ENGINEERING RECOMMENDATIONS



Fine Gears
MADE TO ORDER:
SPIRAL BEVEL
STRAIGHT BEVEL
HYPOID
HERRINGBONE
HELICAL
DIFFERENTIALS
SPUR
WORMS AND WORM GEARS

MASS production of fine gears is an accomplishment that requires the ultimate in manufacturing facilities and experience. And it's all here at Fairfield — metallurgical departments, batteries of the most modern machines, complete heat treating equipment, all operated by skilled craftsmen producing truly fine gears. Here is 30 years of experience translated into the gear-making "know-how" that is essential to manufacturing high quality, dependable gears.

Our facilities are complete for producing gears for a wide variety of applications. Why not consult Fairfield on your next gear problem? Your inquiry will receive prompt attention.

FAIRFIELD MANUFACTURING CO.
303 SO. EARL AVE. LAFAYETTE, INDIANA

Dust Collector Catalog

INFORMATION on the high narrow inlet slot, a feature of the Valmont type S dust collector, is included in a 16-page booklet published by Prat-Daniel Corp., East Port Chester, Conn. This feature is said to increase collection efficiency in the range below 20 microns. Also described in catalog No. 250S are internal changes and proportionate dimensional revisions of the tube. A nomograph chart is included for determining number of tubes required for a given capacity, temperature and resistance, followed by tables for determining dimensions of the collector for any number of required tubes.

100 Holes Simultaneously

AVERAGING one completed part every 2 minutes is the 1000 per cent improved production record of a machine built by Zagar Tool Inc., Cleveland, for drilling holes in large aluminum castings. The part has two sides, with an average of about 100 holes on each side. Holes range from ⅛ to ⅝-inch in diameter.

Drill head itself is driven by a hydraulic motor deriving its power from the 15-hp motor in the machine base. Feeding mechanism is by a vertical ram which presses the workpiece into the drills.

Might Be the Biggest

THE 4-FOOT throat depth of a foot press made by Whitney Metal Tool Co., Rockford, Ill., makes it the biggest machine of its type built by the company and possibly the largest ever built. Made for Chicago Bridge & Iron Co., for their Salt Lake City, Utah, branch, it is to be used for punching holes along the sides of standard 4-foot sheets of hard, compressed composition board. The Whitney-Jensen press allows the operator to slide the sheet into the extra-deep throat of the machine and thus work along the near edge with better vision of the work.

Details Bearing Maintenance

SERVING as a guide to prevent mishandling and improper maintenance practices, source of many bearing failures, is a booklet, "Installation, Maintenance, Removal of Anti-Friction Bearings." Compiled by Anti-Friction Bearing Distributors' Association Cleveland, the illustrated booklet gives detailed information on bearing types, cleaning and removing of bearings, installation, lubrication and tips on how to handle and prepare bearings for storage.

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LETTERS
to the Editors

New Twist

In the Jan. 9th issue on page 45, under the title, "Stepping-Up Notch," there is a reference to a new type of twist drill developed by Westinghouse Electric Corp. Can you tell us where we can get more complete information about this?

J. R. Mooney, General Manager
Texasteel Mfg. Co.
Fort Worth, Texas

We suggest that you write the company, 306 Fourth Avenue, Pittsburgh 30, Pa., for further details.—The Editors

Film on Stainless

We have a problem in regard to welding and polishing stainless steel. We would appreciate it very much if you could tell us where we could locate a film giving instructions on stainless steel welding and polishing.

W. E. Gunnerson
Sales Manager
Anderson Bros. Mfg. Co.
Rockford, Ill.

Wide use is being made of motion pictures for education and training in industry today. We are sending a list of companies which have made training and educational films available.—The Editors

Wheels for Cutting Wire

We are interested in carborundum or abrasive wheels for cutting small pieces of steel wire. Can you give us a list of manufacturers of wheels for this purpose?

L. E. Kinn
President & General Manager
Seneca Wire & Mfg. Co.
Fostoria, O.

Names of six companies have been forwarded.—The Editors

Torque Convertor

I read your articles on "Mirrors of Motordom" each week and think they are very informative and interesting. Several months ago there was an article which stated that Cadillac and Oldsmobile would install in their 1950 models a new torque converter. I am quite curious to know why they did not install it on the 1950 model which is being shown presently. Is it likely that later in the summer they will switch over to the torque converter?

J. W. Hall
Consolidated Western Steel Corp.
Fresno, Calif.

Earlier reports indicated that Cadillac was running tests on a revised type of transmission which combined features of both the Hydra-matic and Dynaflow units. Apparently this work did not mature to the production stage and the 1950 Cadillacs merely have improved versions of the Hydra-matic. We are unable to explain why the new transmission has not progressed further, but it is doubted that there will be any change made this year. Perhaps it is a matter of costs and the fact that most users of the Hydra-matic appear satisfied with it.—The Editors

Polished Sheets Dept.

Can you give us the name or names of manufacturers of polished steel sheets? Some years ago we were able to get "Wellsville" and "Canada Blue" sheets from the U. S. Steel Co., but they have discontinued the manufacture of these sheets.

E. Izzard
Secretary-Treasurer
James Stewart Mfg. Co. Ltd.
Woodstock, Ont.

A list of manufacturers of steel sheets is on its way.—The Editors

Stainless Tearsheets

I have read with great interest the article on "Finished Stainless Powder Parts" in your Dec. 26, 1949 issue, page 55. Although the organization with which I have been doing some work receives your publication in its library, it would be appreciated if I could be sent a tearsheet of the article that is cited above for further use.

John W. Barnet, Director
International Technical Services
Washington, D. C.

Tearsheets of the article are being forwarded with our compliments.—The Editors

Versatile!
General machine shop and maintenance work often require an all-purpose heavy duty open-gap forcing press adaptable to the many kinds of operations involved. That's what makes this versatile 100-ton R. D. Wood HydroLectric Press valuable to you, from both cost and production standpoints. Moreover, it's used for machinery and appliance component assembly on a production basis, with the addition of suitable fixtures and accessories. It's made in various sizes and capacities.
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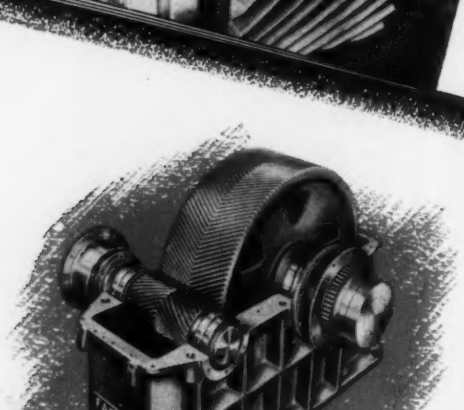


On page 5 of Farrel's latest bulletin on speed reducers, you will find a description of the *Gear with a Backbone* —the type of gear used in Farrel gear units.

The *backbone,* formed where the helices meet, makes the teeth continuous across the gear, providing extra strength and greater load-carrying and shock capacity —especially important in heavy-duty speed reducers. Precision generation by the famous Farrel-Sykes method assures accuracy of tooth spacing, tooth contour and helix angle, which pay off in smooth, quiet, uniform operation.

In addition to describing the gears, this bulletin also contains specifications, horsepower rating tables, overhung load capacities, dimensions and weights of single, double and triple reduction units.

If you buy or specify speed reducers, you should have a copy of this informative manual. Fill out the coupon and mail it today. FB-562

FARREL-BIRMINGHAM CO., INC., 344 Vulcan St., Buffalo 7, N.Y.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Cleveland, Detroit, Chicago, Los Angeles, Tulsa, Houston

FARREL-BIRMINGHAM COMPANY, INC. S
344 VULCAN STREET, BUFFALO 7, N. Y.

Please send me, without cost or obligation, a copy of Bulletin 449, "Farrel Speed Reducers."

Name..... Title.....

Company.....

Address.....

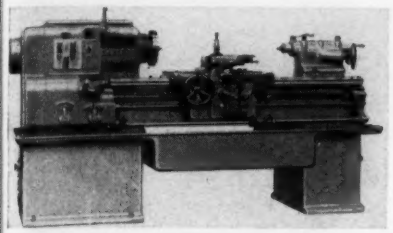
City..... State.....

Farrel-Birmingham ®

New Products and Equipment

More and Higher Speed Lathes

Line of heavy duty engine lathes announced by R. K. LeBlonde Machine Tool Co., Cincinnati, 8, O., includes 12, 14 and 16-inch swing sizes with 24 spindle speeds and a 20-inch size with 32 spindle speeds. A maximum of 1250 rpm is attained in the 12 and 14-inch sizes. All are arranged for higher powered motors: 12 and 14-inch sizes, 7½-hp 1800-rpm motor;



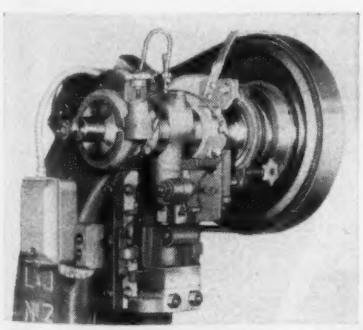
16-inch size, 10 or 15-hp, 1800 rpm motor; 20-inch size, 15 and 20-hp, 1200-rpm motor.

Quick change gear box is automatically lubricated. Sixty feed and thread changes are obtained through hardened alloy steel gears and shafts are supported on antifriction bearings. Apron is one-piece construction with positive jaw feed clutch and single lever length and cross feed control. Tailstock is the offset thrust-lock type.

Check No. 1 on Reply Card for more Details

Offers Friction Clutches

High operating speeds, high rate of engagement per minute without heating, less starting shock and prevention of overloading by adjustment are features of a friction clutch avail-



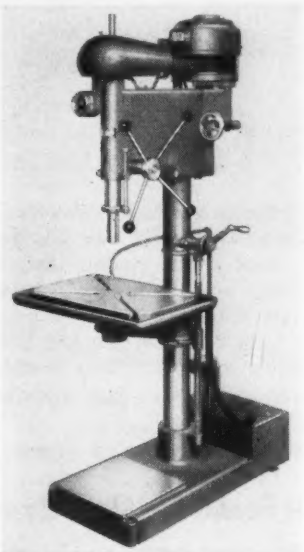
able for inclinable punch presses built by L & J Press Corp., Ren St. and Sterling Ave., Elkhart, Ind. Clutch operation is based on the use of a cone clutch which grips on a self-energizing principle after being first engaged by compression springs. The harder the pull, tighter clutch grips.

Cone clutch has sintered metal facings. A safety feature is that disengagement does not depend on springs. Three steel balls rotating in inclined grooves between the two plates disengage the cone when one of the plates is stopped by a brake. Foot treadle hand lever, compressed air, hydraulic pressure or electricity may be used for control purposes.

Check No. 2 on Reply Card for more Details

Big Swing Drilling Machine

A 25-inch swing is incorporated into the model E-25, medium-weight drilling machine offered by Sibley Machine & Foundry Corp., South Bend, Ind. A variable speed drive makes it possible to have the exact



spindle speed for any size drill from ⅛ to 1 inch. A 1½ hp axial air gap type motor furnishes the power for the machine.

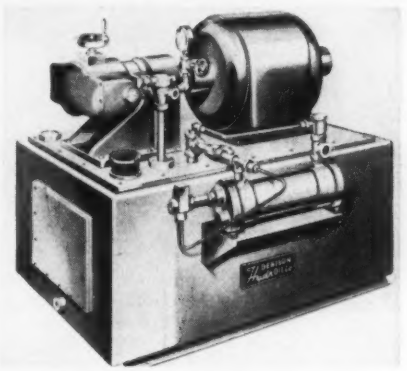
Rated capacity is ¾-inch in steel and 1 inch in cast iron. A wide range of spindle speeds is obtained by a self-locking speed control. A tachometer on the front of the machine provides accurate speed readings. Five options of spindle speeds, each with a 4 to 1 ratio, are available, ranging from a low of 206 to 825 rpm to a high of 540 to 2160 rpm.

Check No. 3 on Reply Card for more Details

Wide Range Pumping Unit

Designed for regulative pressures up to 5000 psi is a new series of oil-hydraulic pumping units, available in 22 models from Denison Engineering Co., Columbus, O. All are designed to specifications recommended by Joint Industry Conference, hydraulic standards for industrial equipment. Each unit consists of a reservoir base, with all operating components, including pump, relief valve, gages and electric motor drive.

Reservoir is supplied in capacities of 55, 110 and 165 gallons. A choice of pumps delivering 9, 20 and 35 gallons per minute for service up to 5000 psi is offered. Accurate adjustment of pressure within desired

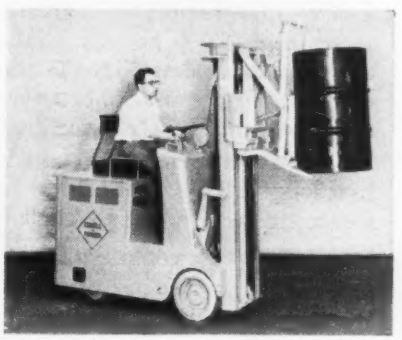


ranges up to 5000 psi can be made with the release valve. The oil cooler consists of a standard two-pass heat exchanger, complete with thermostatic control.

Check No. 4 on Reply Card for more Details

Speeds Drum Handling

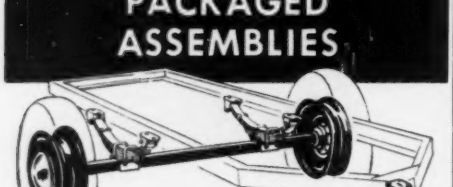
A power truck device which speeds lifting, transporting and stacking of various forms of drums and drum products is being introduced for trucks built by Elwell-Parker Electric Co., Cleveland, O. Device is a



steel frame with base attached to elevating mechanism in the truck's upright column. It is not wider than a standard size 55-gallon oil drum and its handling capacity is 1000 pounds.

An adjustable hook in the forward upper cross member engages the upper chime or rim of the drum, enabling the truck driver to tilt it backward. Two foot-plates or short forks at the bottom of the frame are beveled and each has a groove conforming to the drum contour. A length of flexible cable and a takeup reel

UNITED
Caravan
AXLES
COMPLETE PACKAGED ASSEMBLIES



TYPICAL APPLICATIONS OF CARAVAN ASSEMBLIES

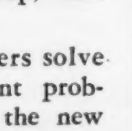
CARAVAN AXLES SOLVE PORTABILITY PROBLEMS

NOW . . . UNITED offers you 2-wheel (single axle) or 4-wheel (front and rear axle) assemblies in complete kits to provide full spring mounted portability for a wide variety of industrial equipment.

CAPACITIES range from 1000 to more than 12,000 pounds. Brakes and Titanic automatic brake control optional. Retractable swivel caster wheel assembly is available for two-wheel units. Mounting brackets will be furnished for under or side-frame attachment.

UNITED has a complete line of equipment including SPECIAL AXLES (straight or drop) and stub spindles.

Let UNITED'S engineers solve your portable equipment problems. Write today for the new "CARAVAN AXLES" catalog or call Bedford 1323 for immediate service.



WRITE FOR CATALOG

THE UNITED MFG. COMPANY
319 Interstate Street, Bedford, Ohio

mounted on the truck's driving panel governs hook position in holding or releasing the barrel.

Check No. 5 on Reply Card for more Details

Exhausts Air Inside

Hisey-Wolf Machine Co., Cincinnati 8, O., is introducing a dust collector which exhausts air inside the building. Dust and grit laden air is thoroughly filtered through closely woven fabric and steel wool filter bags in the self-contained unit. Heavy

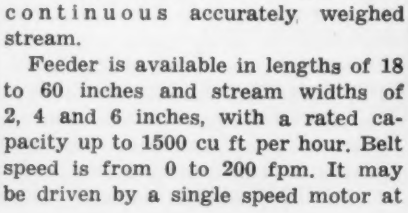
particles are directed downward by baffle plate directly into a large tray.

A foot lever shakes and cleans the bags into the tray which is readily removable. Four models are available with 235, 530, 930 and 1025 cfm capacity and with two 2-inch, two 3-inch and two 4-inch standard inlets.

Check No. 6 on Reply Card for more Details

Belt Feeder For Close Quarters

Richardson Scale Co., Clifton, N. J., is offering a compact, totally enclosed belt feeder for installation in tight places. The fully accessible unit has a wide range of applications as a feeder or "take-away" conveyor. A variable speed drive can be fur-



nished which is automatically adjustable to vary the stream in conformity with timed discharges of an automatic scale, and so maintain a continuous accurately weighed stream.

Feeder is available in lengths of 18 to 60 inches and stream widths of 2, 4 and 6 inches, with a rated capacity up to 1500 cu ft per hour. Belt speed is from 0 to 200 fpm. It may be driven by a single speed motor at

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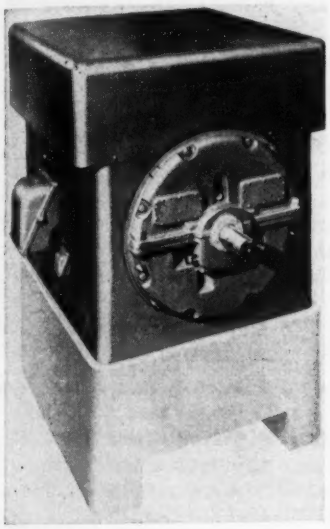
either end, from line shaft, or by special infinitely variable speed drive. Manual control or special remote control up to 30 starts per minute is also available.

Check No. 7 on Reply Card for more Details

Outdoor Installation Motor

Available in ratings from 200 to 3000 hp, a modified base-ventilated motor, designed by General Electric Co., Schenectady 5, N. Y., is for outdoor applications where totally enclosed fan-cooled units are not available. It is designed for mounting on a concrete base which is raised sufficiently to allow contaminated ambient air to flow through the foundation at high velocity, as in a storm.



Ventilating air enters the motor through a vertical passage in the base and is pulled from the ambient air stream at low velocity so that little water or foreign matter can be carried up vertically into the motor. Baffles within the air intake passage are a further precaution against foreign matter. Exhaust ports are protected by an over-hanging metal shield and baffling and are drained.

Check No. 8 on Reply Card for more Details

• • •

REGULATOR FOR BURNERS: A newly designed steam pressure regulator for oil-fired burners using a gravity type feed is offered by Superior Controls Inc., Los Angeles 6, Calif. Type L-25 is recommended for oil-fired boilers or steam generators where automatic control of steam pressure is necessary.

Check No. 9 on Reply Card for more Details

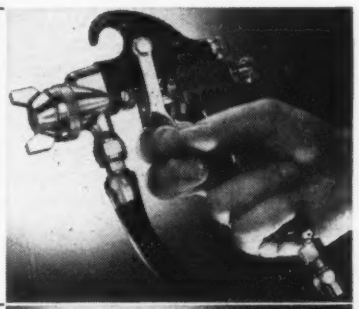
AIR POWERED SANDER: A portable, air-powered sander, adaptable to medium duty sanding or light duty cup wheel grinding, is announced by

Binks for EVERYTHING SPRAY PAINTING

3 ways to better finishes... faster

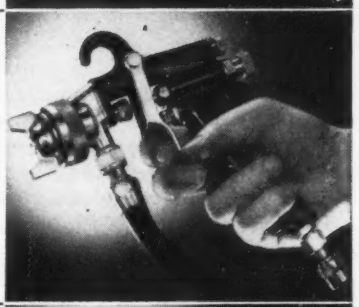
1st way... use a Model 18

latest addition to the Binks line... a precision gun for obtaining the finest finishes possible at the lowest cost. In designing this gun, Binks asked users what they wanted in a spray gun. Model 18 is the answer.



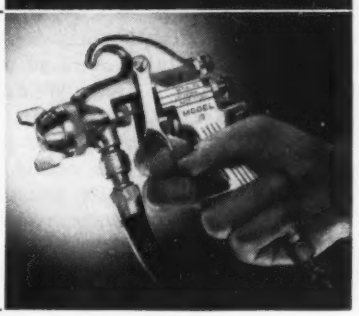
2nd way... use a Model 7

a heavy-duty production gun. This is a long time favorite with wide acceptance in the finishing field. Gun body is drop-forged aluminum with a tough, black electrolytic coating. All parts are of long lasting, wear resistant materials.



3rd way... use a Model 19

a truly remarkable, lightweight production spray gun, employing the same nozzles as Model 18. Reduces fatigue. Body is nickel-plated aluminum. Cartridge-type air valve is economical, easily replaced as a unit.



Binks "Big 3" spray guns are the favorites of industry everywhere. They lead the way to better finishes...faster. When Binks precision-made guns are on the job, you will have finer finishes; rejects will be cut to a minimum; production will be greater; finishing costs, lower.

Take hold of a Binks spray gun. Feel its perfect balance. Note the convenient back-of-gun location for controls...the precision construction of all parts...the fast, uniform coverage and adjustable spray pattern.

All Binks gun parts are made of specially selected, wear-resistant materials. The air nozzle is of nickel-plated bronze; the material nozzle is made of hardened steel with self-centering needle. Cartridge-type air valves are employed in all three models. Because of such sound engineering and manufacturing know-how, Binks guns stand up under hard production use... that's extra economy for you.

"Binks is justly proud of its 'Big 3' production guns. They produce, at minimum cost, the high quality finishes demanded by the buying public."

J. H. Roche
Chairman of the Board

Write now for free information on these guns.

Binks MANUFACTURING COMPANY

3134-40 Carroll Ave., Chicago 12, Ill.

NEW YORK DETROIT LOS ANGELES ATLANTA BOSTON CLEVELAND
DALLAS MILWAUKEE NASHVILLE PHILADELPHIA PITTSBURGH
ST. LOUIS SAN FRANCISCO SEATTLE WINDSOR, ONTARIO, CANADA

Buckeye Tools Corp., Dayton 1, O. It is available in five models with speeds of 7500, 6000, 4500, 3600 or 2400 rpm and is designed for use with 5 or 7-inch sanding pads. For cup wheel grinding, wheel sizes of 4, 5 or 6 inches are indicated by specifications.

Check No. 10 on Reply Card for more Details

TINY SWITCH: Linemaster Compact switch, introduced by Simonds Machine Co. Inc., Southbridge, Mass., consists of a pair of 6½-ounce Compacts mounted on a cast aluminum base. To prevent accidental operation of both at one time, there is a sturdy bridge between them. The foot treadle switch is made of heavy gage steel.

Check No. 11 on Reply Card for more Details

BANDING MACHINE: Heller Co., Cleveland 14, O., announces banding machines to apply Lockbands on outer coverings of cables for identifying purposes. Machine automatically feeds color bands to the forming point. One touch of the pedal sets and locks band at any desired point. Bands are made in many sizes, metals and colors.

Check No. 12 on Reply Card for more Details

PROTECTS SMALL MOTORS: Motor Sentinel, a manual motor starter with positive bimetallic overload protection, is available from Westinghouse Electric Corp., Pittsburgh 30, Pa. Suited for controlling and protecting small motors used with fans, pumps, small machine tools, grinders, etc., starter fits any standard 2½-inch wall box.

Check No. 13 on Reply Card for more Details

HYDRAULIC CYLINDERS: High pressure hydraulic cylinders, made by Miller Motor Co., Chicago 18, Ill., are available in complete standard line from 1½ to 12-inch bores for 2000 or 3500 psi operation. They have solid steel heads, caps and mountings.

Check No. 14 on Reply Card for more Details

WELDING TORCHES: Two new welding torches with cutting attachments are announced by K-G Welding & Cutting Co. Inc., New York, N. Y. E50 torch has a welding range up to about ½-inch, cutting range up to about 3 inches. K50 has a welding range up to tip size 20, complete welding range; cutting range up to 6 inches.

Check No. 15 on Reply Card for more Details

REMOVABLE STOPS: Lyon-Raymond Corp., Greene, N. Y., offers a removable stop for pallet truck forks. It is a bar with two pins or legs that has been designed so that it can be dropped into holes set at fixed points in the truck frame, thus the forks can be quickly fitted to any number of popular size pallets. Stop limits the distance forks can enter and rear wheels of truck are always spotted for perfect operation.

Check No. 16 on Reply Card for more Details

CORROSION PROTECTION: Iridite No. 8-P, announced by Allied Research Products Inc., Baltimore, Md., is a powdered Iridite coating for the corrosion protection of zinc and cadmium.

Check No. 17 on Reply Card for more Details

QUICK SIGHTING: Built to work with all Micromax and Speedomax Rayotube instruments, a new Rayotube detector for use with slab furnaces, soaking pits, open hearths, etc., is announced by Leeds & Northrup Co., Philadelphia 44, Pa. It features a quick sighting optical system and hermetically sealed construction.

Check No. 18 on Reply Card for more Details

POSITIONER: Model B200, made by Aronson Machine Co., Arcade, N. Y., will hold a workpiece in the vise jaws and position the workpiece about three 360 degree rotations. They are the work table, work arm and pedestal axis. A pin lock on the work table and work arm will lock the two rotations. Maximum capacity of this unit is 200 pounds.

Check No. 19 on Reply Card for more Details

V-BELT: Super-7 Texrope belt, introduced by Allis-Chalmers Mfg. Co., Milwaukee, Wis., is an oil resisting high capacity V-belt. It maintains the same stretch characteristics as a standard belt and has the same safety factor margin.

Check No. 20 on Reply Card for more Details

SNAP-ACTION SWITCH: No. 1HS1 is a small size hermetically sealed snap-action switch, introduced by Micro Switch, Freeport, Ill., whose electrical or mechanical operation is unaffected by corrosive atmospheres, change in atmospheric pressure or change in temperatures. It may be operated under oil or other fluids.

Check No. 21 on Reply Card for more Details

ABRASIVE DISKS: Bay State Abrasive Products Co., Westboro, Mass., offers DuraCut, flexible abrasive disks. They are available in 7 and 9-inch diameters, ⅛-inch thick, in raised hub or flat shapes.

Check No. 22 on Reply Card for more Details

LOW HYDROGEN ELECTRODES: There are 14 different types in the new line of low hydrogen electrodes produced by Harnischfeger Corp., Milwaukee, Wis. They cover all welding applications where low hydrogen electrodes are desired. Electrodes have moderate penetrating arc with an easy to remove slag.

Check No. 23 on Reply Card for more Details

FILE CONTROL: Handee-Guide file handle, available from Riverview Foundry Co., Fall River, Mass., can be changed from one size file to another quickly. Filing is done with a planing motion, giving a level even stroke. It has a tapering groove into which the shank of the file easily slips.

Check No. 24 on Reply Card for more Details

HIGH RATIOS: Gear reductions as high as 750,000 to 1 are available in the new line of miniature speed changers developed by Metron Instrument Co., Denver 9, Colo. These special units are made up by adding one or two additional gearing sections to the standard three section units having ratios up to 3375 to 1.

Check No. 25 on Reply Card for more Details

HOLDS DOWN WORKPIECE: Eliminating the customary usage of slotted strips of mild steel and odd assortments of shims as clamping devices, an English-made clamping device for holding down workpieces on tables or faceplates of milling machines, lathes, boring machines and other machine tools, is being offered by Montgomery & Co., New York 7, N. Y. Clamps can be adjusted to infinite heights up to 6 inches. Two complete sets of clamps on each machine should hold down the heaviest job.

Check No. 26 on Reply Card for more Details

COMBINATION SHEAVES: Five new sizes of wide-range variable speed combination sheaves are introduced by Speed Selector Inc., Cleveland 13, O. New sizes cover a wide range of speed and load capacities up to 7½ hp with speed changes as high as 7:1. The 3, 4, 5, 6 and 7-inch single groove sizes are each available in two types, spring loaded and controllable.

Check No. 27 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

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Helpful Literature

75. Snap Action Switches

Micro Switch Div., First Industrial Corp.—4-page illustrated folder "Micro Tips" presents adaptations of snap action switches to improve products, lower production costs, make machines automatic, protect equipment and personnel and increase production.

76. Milling Machines

Cincinnati Milling Machine Co.—24-page illustrated publication No. M-1647 reviews four models of dual power dial type milling machines. Having wide range of spindle speeds in ratio of 100 to 1, machines are capable of taking heavy cuts on large parts with either sintered carbide or high speed steel cutters.

77. Mining Equipment

Black, Sivalls & Bryson, Inc.—8-page illustrated booklet "Products for Mining" describes propane systems; special fabrications; Safwalk material for walkways, stairways, platforms and docks; safety heads and bolted steel, wood and welded tanks.

78. Wood Screws

Blake & Johnson Co.—4-page illustrated folder "Twin Fast Screws for Wood and Plastics" explains design and applications of wood and plastic screws which feature relieved shank diameter, parallel twin threads, cylindrical construction and single centered point.

79. Stainless Strip

Wallingford Steel Co.—2-page illustrated catalog sheet presents information on 18-8 bright annealed stainless strip available in widths up to 15 in. and in gages from 0.005 to 0.070-in. Listed are comparable properties of other chrome-nickel type steels.

80. Synchronous Generators

General Electric Co.—8-page illustrated bulletin GEA-5415 deals with Tri-Clad high speed synchronous generators having ratings from 12½ to 1250 kva and speeds from 1800 to 514 rpm. Units are recommended for standby, portable and prime source power in widespread fields of application.

81. Turning Tool

R & L Tools—48-page illustrated pocket-size booklet and 20-page supplement describe right and left hand combination turning tool. Shown are various applications of this tool and accessories that can be obtained for special operations. Supplement lists several new tools including cutoff blades, universal tool post, tap and die holders and floating drill holders.

82. Scrap Metal Baler

Dempster Bros. Inc.—6-page illustrated form 275-A describes model 275 Dempster Balester hydraulic scrap metal press. Unit turns out high-density 300 to 400-lb bales measuring 14 x 14 x 22 in. at approximate rate of 3½ to 4 tons per hour. Standard unit features two-ram design, 75-hp standard electric motor and hydraulically-operated skip-pan loader.

83. Direct Flow Pump

Aldrich Pump Co.—6-page illustrated data sheet 64 deals with Triplex direct flow pump with 5-in. stroke. Construction and design data, specifications, dimension drawings, selection chart and drive specifications are included.

84. Arc Welding Machines

Air Reduction Sales Co.—36-page illustrated arc welding machine catalog is divided in two parts, first dealing with alternating current arc welders and second with direct current machines. Distinctive features, operating data, specifications and other pertinent information about each machine are discussed.

85. Safety Equipment

General Scientific Equipment Co.—46-page illustrated 1950 issue of "Everything in Safety" covers respiratory devices, eye protection, hats, gloves, carboy pumps and miscellaneous industrial safety equipment for use in mines, utilities and industry.

86. Alloy Steel

Jones & Laughlin Steel Corp.—40-page illustrated brochure form No. AD155 shows uses, lists applications and presents nine case histories involving use of Jalloy heat treated alloy steel plate. Technical data on this material, hardenability chart, decimal equivalents and other information are included.

87. Pressure-Vacuum Blowers

Standard Stoker Co., Stoker Div.,—4-page illustrated publication No. 86 presents data to aid in selection of proper Standardaire blowers for service up to 20 psi. They can be direct-connected to standard speed motors and are sized so that capacities up to 10,000 cfm can be attained by this type of drive.

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88. Rails & Track Accessories

L. B. Foster Co. — 6-page illustrated folder F-949 describes new and relaying rails and lists tables of weights and information on track bolts, spikes, splice bars and joints. Metal 7-in. Rail Ruler which is offered gives weight and dimensional data on full range of rail sections from 12 to 100 lb.

89. Light Metal Diecastings

Aluminum Co. of America—190-page illustrated book "Designing for Alcoa Die Castings" explains where to use aluminum and magnesium diecastings and presents data on diecasting machines, dies, choice of alloy and design. Brief discussions of machining, finishing, inspection and testing of diecastings are presented also.

90. Metal Cutters

H. K. Porter, Inc.—4-page illustrated file No. 521 presents additions to Power line cutters and Handklip tools. New units include shear, wire and angle cutters; cross link tire chain tool; and cutter for lead sheathed communication cable. Full line is briefly covered, and specifications of all tools are listed.

91. Gages

Cadillac Gage Co.—36-page illustrated catalog depicts various gages including thread plug and ring, concentricity, pipe thread, reversible cylindrical, Pla-Chek, toolmaker's and adjustable snap ring gages. Charts show available standard sizes, and special section of catalog gives practical information for everyday use of these tools.

92. Worm Gear Speed Reducers

De Laval Steam Turbine Co., Imo-De Laval Products Div.—28-page illustrated bulletin G-WB concerns single reduction horizontal worm gear speed reducers. They are supplied in ratios from 3:1 to 100:1. Publication depicts various types available; offers selection information and lists ratings, dimensions and loads.

93. Coal Dust Control

Aquadyne Corp. — 4-page illustrated folder "Coal Dust Control" tells how Wet Water system makes possible control of coal dust. System consists of water, Aquadyne capsule and Hydroblender. Solution can be applied by hand spraying or through fixed spray system.

94. Boring Fixture

Ex-Cell-O Corp.—4-page illustrated bulletin No. 31101 lists both manual and hydraulically operated fixtures available for use on all styles of company's precision boring machines. Shown also are various types of small production run jobs that illustrate fast setups and change-overs possible with this equipment.

95. Metal Treating & Finishing

Heatbath Corp.—20-page file is entitled "Technical Data for Metal Treating Products and Metal Finishing Products." Treating and finishing procedures are outlined; and melting points, working ranges, specific heats and densities for variety of materials are listed.

96. Rotary Files

R. G. Haskins Co.—4-page illustrated bulletin No. RF-50 covers line of carbide rotary files and ground cutters. They are usable with flexible shaft machines and other portable tools. Rotary files are made from high speed steel, and carbide files are ground from solid and brazed on steel shanks.

97. Electricians' Gloves

B. F. Goodrich Co.—Illustrated catalog section No. 9036 discusses electricians' gloves made by Anode process which deposits rubber on glove form in one layer. This assures uniform strength; eliminates weakening foreign particles; and provides resistance to tearing, snagging and bruising.

98. Automatic Turret Lathes

Potter & Johnston Co.—16-page illustrated bulletin 139 presents seven models of automatic turret lathes. Each unit is briefly described, special features are illustrated and complete specifications are tabulated. Space is devoted also to typical special tool set-ups.

99. Sectional Conveyor

Hewitt-Robins Inc., Robins Conveyors Div.—4-page illustrated bulletin No. 132 describes sectional conveyor that can be assembled in field. It consists of drive section, tail section and any desired number of intermediate truss sections to form conveyor of any length up to limitations of belt.

100. Carbide Products

Vascoloy-Ramet Corp.—92-page illustrated catalog No. VR-440 presents data on carbide tools, blanks, wire drawing dies, drills, end mills and blades; Tantung castings; and vertical and horizontal toolholders and inserts. Ten standard carbide grades are tabulated with various machining operations and types of materials to simplify selection of proper grade for specific application.

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Market Summary

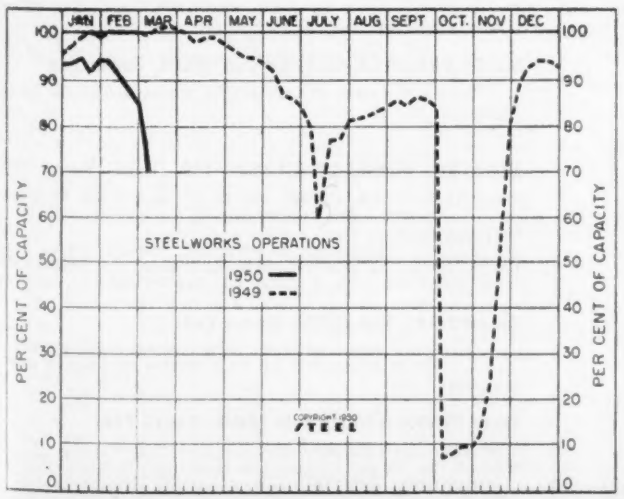
MARCH production of steel is expected to drop to the lowest point since the nation-wide steel strike last fall. Drastic reductions in blast furnace, openhearth, bessemer converter and finishing mill operations the past week because of coal, power and gas shortages, are likely to be followed this week by further sharp curtailments. Even should coal mining be resumed quickly in large volume, it will take the steel mills 10 days to two weeks to get back to high production levels after coal begins to move from the mines. Poor output record for the month consequently appears certain, ingot operations for the period possibly not exceeding last November's average of 53.3 per cent of capacity. Disruption of steel production at this time points to higher summer operations than had been anticipated until recently.

OPERATIONS— The national steelmaking rate last week averaged an estimated 70 per cent of capacity. This is a drop of 15.5 points from the preceding week. Actual operations at the weekend, however, were several points under the average. At the same time metalworking activities are being increasingly hampered by coal, power and gas shortages and with steel shipments slowing down manufacturing operations are headed for a sharp decline with heavy resulting unemployment. Last week the steelmaking rate fell 33 points to 54.5 per cent at Pittsburgh, 32 points to 43 in Youngstown, 27 points to 55 in Birmingham, 12 points to 61 in eastern Pennsylvania, 10 points to 96 in Detroit, 7 points to 81 in the West, 7 points to 89 in the Cincinnati area, 4.5 points to 84.5 in St. Louis, 3½ points to 88.5 in Chicago, 2.5 points to 93.5 in Buffalo, and 1 point to 89 in Wheeling. In New England the ingot rate went up 2 points to 80 per cent, while the Cleveland rate held steady at 97 per cent. Additional blast furnaces have been banked and many of those still operating are on greatly reduced wind.

SUPPLIES— With finishing mill operations slowing down steel shipments are slipping in the various product categories. And the slackening will accelerate over the next week or so as more mills are forced onto the idle list by shortages of semifinished steel. The supply stringency in sheets is becoming increasingly pronounced. It now appears heavy mill tonnage carryover from first quarter will push some second quarter deliveries into third quarter. In carbon bars, structurals, plates and other major product classifications, the outlook is less threatening than in sheets. But satisfactory supply conditions could be quickly reversed should widespread and extended suspension of rolling mill operations be experienced.

DEMAND— Although metalworking operations at many points are being curtailed by coal shortage and restrictions on use of power and gas, demand for steel is stronger. Pressure for deliveries is noticeably heavier in some areas as consumers strive to build stocks against expected supply shortages over coming weeks. Significantly, the increased pressure is not confined to the light, flat-rolled items which have been in short supply since end of the steel strike. Consumers now are showing considerably more concern over their inventories of bars, plates, shapes and other products. They see unbalanced stocks as a greater menace to manufacturing operations than the actual curtailment of steel production.

PRICES— Finished steel prices are firmly established at the higher levels. Minor adjustments in extra cards continue to be made but otherwise the markets are featureless pricewise. STEEL's weighted index on finished steel is unchanged at 156.13 as is the arithmetical price composite at $93.18. Pig iron composites also are steady with No. 2 foundry, $46.47, basic, $45.97, and malleable, $47.27. Steelmaking scrap composite is off slightly to $27.33.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Mar. 4	Change	Same Week 1949	Same Week 1948
Pittsburgh	54.5	—33*	98	96
Chicago	88.5	— 3.5*	100.5	94
Eastern Pa.	61	—12	97	91
Youngstown	43	—32	105	103
Wheeling	89	— 1	92	90
Cleveland	97	None	99.5	94
Buffalo	93.5	— 2.5	104	88.5
Birmingham	55	—27	100	100
New England	80	+ 2	87	85
Cincinnati	89	— 7	106	90
St. Louis	84.5	— 4.5	82.5	77.5
Detroit	96	—10	103	90
Western	81	— 7	..	..
Estimated national rate	70	—15.5	99.5	94.5

Based on weekly steelmaking capacity of 1,906,267 net tons for 1950; 1,843,516 net tons for 1949; 1,802,476 net tons for 1948.
*Changed from revised rate.

Composite Market Averages

	Mar. 2 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	156.13	156.13	156.13	154.85	100.65
Index in cents per lb....	4.230	4.230	4.230	4.195	2.727
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$93.18	$93.18	$93.00	$97.32	$57.55
No. 2 Fdry Pig Iron, GT	46.47	46.47	46.22	46.63	24.67
Basic Pig Iron, GT.....	45.97	45.97	45.72	46.22	24.00
Malleable Pig Iron, GT..	47.27	47.27	47.27	47.34	25.29
Steelmaking Scrap, GT..	27.33	27.67	26.83	38.17	19.17

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Mar. 2 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh....	3.45	3.45	3.45	3.35–55	2.15
Bars, H.R., Chicago.....	3.45	3.45	3.45	3.35	2.15
Bars, C.F., Pittsburgh	4.10–15	4.10–15	4.10–15	3.95–4.25	2.65
Shapes, Std., Pittsburgh ..	3.40	3.40	3.40	3.25–30	2.10
Shapes, Std., Chicago.....	3.40	3.40	3.40	3.25	2.10
Plates, Pittsburgh	3.50	3.50	3.50	3.40–60	2.20
Plates, Chicago	3.50	3.50	3.50	3.40	2.20
Plates, Coatesville, Pa.	3.60	3.60	3.60	3.75	2.20
Plates, Sparrows Point, Md.	3.50	3.50	3.50	3.45	2.20
Plates, Claymont, Del. ...	3.60	3.60	3.60	3.95	2.20
Sheets, H.R., Pittsburgh..	3.35	3.35	3.35	3.25–30	2.20
Sheets, H.R., Chicago.....	3.35	3.35	3.35	3.25	2.20
Sheets, C.R., Pittsburgh...	4.10	4.10	4.10	4.00	3.05
Sheets, C.R., Chicago.....	4.10	4.10	4.10	4.00	3.05
Sheets, C.R., Detroit	4.30	4.30	4.30	4.20	3.15
Sheets, Galv., Pittsburgh..	4.40	4.40	4.40	4.40	3.65
Strip, H.R., Pittsburgh....	3.25	3.25	3.25	3.25–70	2.10
Strip, H.R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh....	4.15	4.15	4.15	4.00–75	2.80
Strip, C.R., Chicago.....	4.30	4.30	4.30	4.00–25	2.90
Strip, C.R., Detroit	4.35–40	4.35–40	4.35–40	4.20–50	2.90
Wire, Basic, Pittsburgh...	4.50	4.50	4.50	4.15–50	2.60
Nails, Wire, Pittsburgh...	5.30	5.30	5.30	5.15–6.30	2.80
Tin plate, box, Pittsburgh.	$7.50	$7.50	$7.50	$7.75	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$63.00	$63.00	$63.00	$61.00	$40.00
Sheet bar, mill (NT)	57.00–58.00	57.00–58.00	57.00–58.00	67.00	34.00
Wire rods, ½-⅝", Pitts. .	3.85	3.85	3.85	3.40–4.15	2.00

PIG IRON, Gross Ton

Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$25.50
Basic, Valley	46.00	46.00	46.00	46.00	24.50
Basic, del. Phila.	49.44	49.44	49.44	50.30	26.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	25.00
No. 2 Fdry, Chicago.....	46.50	46.50	46.50	46.00–50	25.00
No. 2 Fdry, Valley.....	46.50	46.50	46.50	46.50	25.00
No. 2 Fdry, del. Phila. ...	49.94	49.94	49.94	50.80	26.84
No. 2 Fdry, Birm.....	42.38	42.38	39.38-42.38	43.38	21.38
No. 2 Fdry.(Birm.)Del Cin.	49.08	49.08	46.08	49.43	25.06
Malleable, Valley	46.50	46.50	46.50	46.50	25.00
Malleable, Chicago	46.50	46.50	46.50	46.50	25.00
Charcoal, Lyles, Tenn, ...	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	140.33*

* Delivered, Pittsburgh.

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts...	$31.00	$32.00	$32.00	$39.00	$20.00
No. 1 Heavy Melt. E. Pa..	23.50	23.50	23.50	39.00	18.75
No. 1 Heavy Melt. Chicago	27.50	27.50	27.50	34.00	18.75
No. 1 Heavy Melt. Valley..	31.25	31.25	31.75	37.75	20.00
No. 1 Heavy Melt. Cleve.:	28.25	28.25	28.25	36.50	19.50
No. 1 Heavy Melt. Buffalo	28.25	28.25	28.25	39.50	19.25
Rails, Rerolling, Chicago..	40.50	40.50	40.50	45.75	22.25
No. 1 Cast, Chicago.....	41.00	41.00	41.00	41.50	20.00

COKE, Net Ton

Beehive, Furn., Connlsvl...	$13.25	$13.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl. .	15.50	15.50	15.50	17.00	7.75
Oven Fdry., Chicago	21.00	21.00	21.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	18.50	18.50	18.50	23.50	12.00
Zinc, E. St. Louis.....	9.75	9.75	9.75	17.50	8.25
Lead, St. Louis	11.80	11.80	11.80	21.30–35	6.35
Tin, New York	74.125	74.125	74.375	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	24.50	27.25	27.25	38.50	14.50
Nickel, refinery, duty paid.	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.50
Newark,del	50.63	51.13	51.63	52.13
Brooklyn,N.Y.,del.	....	52.79	53.29	....
Birmingham District				
Birmingham R2	41.88	42.38	....	....
Birmingham S9	41.88	42.38	....	....
Woodward,Ala. W15	41.88	42.38	....	....
Cincinnati,del.	....	49.08	....	....
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	....
Tonawanda,N.Y., W12	46.00	46.50	47.00	....
N.Tonawanda,N.Y. T9	....	46.50	47.00	....
Boston,del.	55.26	55.76	56.20	....
Rochester,N.Y.,del.	48.63	49.13	49.63	....
Syracuse,N.Y.,del.	49.58	50.08	50.58	....
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.00
Gary,Ind. C3	46.00	....	46.50	....
IndianaHarbor,Ind. I-2	46.00	....	46.50	....
So.Chicago,Ill. W14, Y1	46.00	46.50	46.50	....
So.Chicago,Ill. C3	46.00	....	46.50	47.00
Milwaukee,del	47.89	48.39	48.39	48.89
Muskegon,Mich.,del.	....	51.98	51.98	....
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.00
Cleveland R2	46.00	46.50	46.50	....
Akron,del. from Cleve.	48.39	48.89	48.89	49.39
Lorain,O. N3	46.00	....	....	47.00
Duluth I-3	....	....	46.50	....
Erie,Pa. I-3	46.00	46.50	46.50	47.00
Everett,Mass. E1	....	50.50	51.00	....
Fontana,Calif. K1	52.00	52.50	....	....
Geneva,Utah G1	46.00	46.50	....	....
Seattle,Tacoma,Wash.,del.	....	54.20	....	....
Portland,Oreg.,del.	....	54.20	....	....
LosAngeles,SanFrancisco,del.	53.70	54.20	....	....
GraniteCity,Ill. M10	47.90	48.40	48.90	....
St.Louis,del.(incl. tax)	48.65	49.15	49.65	....
Ironton,Utah C11	46.00	46.50	....	....
Minnequa,Colo. C10	47.00	47.50	47.50	....
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.00
Pitts,N.&S. sides, Ambridge, Aliquippa,del.	47.19	47.69	47.69	48.19
McKeesRock,del.	46.95	47.45	47.45	47.95
Lawrenceville,Homestead, McKeesport,Monaca,del	47.44	47.94	47.94	48.44
Verona,del.	47.90	48.40	48.40	48.90
Brackenridge,del.	48.13	48.63	48.63	49.13
Bessemer,Pa. C3	46.00	....	46.50	47.00
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	....
McKeesport,Pa. N3	46.00	....	....	47.00
Sharpsville,Pa. S6	46.00	46.50	46.50	47.00
Steelton,Pa. B2	48.00	48.50	49.00	49.50
Steubenville,O. W10	46.00	....	....	....
Struthers,O. S16	46.00	....	....	....
Swedeland,Pa. A3	48.00	48.50	49.00	49.50
Philadelphia,del.	49.44	49.94	50.44	50.94
Toledo,O. I-3	46.00	46.50	46.50	47.00
Cincinnati,del.	51.01	51.51	....	....
Troy,N.Y., R2	48.00	48.50	49.00	49.50
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	....
Youngstown C3	46.00	....	....	47.00
Youngstown Y1	46.00	46.50	46.50	47.00
Mansfield,O.del.	50.26	50.76	50.76	51.26

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.5% Si to 11.50%)

Jackson,O. G2, J1	$57.00
Buffalo H1	56.50

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71.50
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2	77.00
Keokuk,Iowa, OH & Fdry., 12½ lb. piglets, frt, allowed K2.	82.00
Wenatchee,Wash., OH & Fdry, frt. allowed K2	77.00

CHARCOAL PIG IRON, Gross Ton

(Low phos. semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

LylesTenn. T3	$80.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, Intermediate, A7	$51.00
Steelton,Pa. B2	54.00
Philadelphia delivered	57.00
Troy,N.Y. R2	54.00

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL, Mar. 2, 1950; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Detroit R7 ..... $50.00
Munhall,Pa. C3 ..... 50.00

INGOTS, Alloy (NT)
Detroit R7 ..... $51.00
Houston,Tex. S5 ..... 59.00
Midland,Pa. C18 ..... 51.00
Munhall,Pa. C3 ..... 51.00
So.Duquesne,Pa. C3 ... 51.00

BILLETS, BLOOMS & Slabs Carbon, Rerolling (NT)
Bessemer,Pa. C3 .... $53.00
Clairton,Pa. C3 ..... 53.00
Conshohocken,Pa. A3 .58.00
Ensley,Ala. T2 ..... 53.00
Fairfield,Ala. T2 ..... 53.00
Fontana,Cal. K1 ..... 72.00
Gary,Ind. C3 ..... 53.00
Johnstown,Pa. B2 ..... 53.00
Lackawanna,N.Y. B2 .. 53.00
Munhall,Pa. C3 ..... 53.00
Sharon,Pa. S3 ..... 57.00
So.Chicago,Ill. C3 .... 53.00
So.Duquesne,Pa. C3 .. 53.00

Carbon, Forging (NT)
Bessemer,Pa. C3 .... $63.00
Buffalo R2 ..... 63.00
Canton,O. R2 ..... 63.00
Clairton,Pa. C3 ..... 63.00
Cleveland R2 ..... 63.00
Conshohocken,Pa. A3.. 65.00
Detroit R7 ..... 63.00
Ensley,Ala. T2 ..... 63.00
Fairfield,Ala. T2 .... 63.00
Fontana,Calif. K1 .... 82.00
Gary,Ind. C3 ..... 63.00
Geneva,Utah G1 ..... 63.00
Houston,Tex. S5 ..... 71.00
Ind.Harbor,Ind. I-2 ... 63.00
Johnstown,Pa. B2 .... 63.00
Lackawanna,N.Y. B2 .. 63.00
LosAngeles B3 ..... 82.00
Munhall,Pa. C3 ..... 63.00
Seattle B3 ..... 82.00
So.Chicago C3,R2,W14. 63.00
So.Duquesne,Pa. C3 .. 63.00
So.SanFrancisco B3 .. 82.00
Warren,O. C17 ..... 63.00

Alloy (NT)
Bethlehem,Pa. B2 ... $66.00
Buffalo R2 ..... 66.00
Canton,O. R2, T7 .... 66.00
Conshohocken,Pa. A3 .. 68.00
Detroit R7 ..... 66.00
Fontana,Calif. K1 .... 82.00
Gary,Ind. C3 ..... 66.00
Houston,Tex. S5 ..... 74.00
Ind.Harbor,Ind. Y1 .... 66.00
Johnstown,Pa. B2 .... 66.00
Lackawanna,N.Y. B2 .. 66.00
LosAngeles B3 ..... 86.00
Massillon,O. R2 ..... 66.00
Midland,Pa. C18 ..... 66.00
Munhall,Pa. C3 ..... 66.00
Sharon,Pa. S3 ..... 66.00
So.Chicago C3,R2,W14. 66.00
So.Duquesne,Pa. C3 .. 66.00
Warren,O. C17 ..... 66.00
Youngstown Y1 ..... 66.00

SHEET BARS (NT)
Mansfield,O. E6 ..... $58.00
Sharon,Pa. S3 ..... 57.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 ..... $76.00
Cleveland R2 ..... 76.00
Ind.Harbor,Ind. I-2 .... 76.00
Massillon,O. R2 ..... 76.00
So.Chicago,Ill. R2 .... 76.00

SKELP
Aliquippa,Pa. J5 ..... 3.25
Munhall,Pa. C3 ..... 3.15
Warren,O. R2 ..... 3.15
Youngstown C3, R2 ... 3.15

WIRE RODS
AlabamaCity,Ala. R2 .. 3.85
Buffalo W12 ..... 3.85
Cleveland A7 ..... 3.85
Donora,Pa. A7 ..... 3.85
Fairfield,Ala. T2 ..... 3.85
Houston,Tex. S5 ..... 4.25
Ind.Harbor,Ind. Y1 .... 3.85
Johnstown,Pa. B2 ..... 3.85
Joliet,Ill. A7 ..... 3.85
LosAngeles B3 ..... 4.65
Minnequa,Colo. C10 ... 4.10
Monessen,Pa. P7 ..... 3.85
No.Tonawanda,N.Y. B11. 4.10
Pittsburg,Calif. C11 ... 4.50
Portsmouth,O. P12 .... 3.85
Roebling,N.J. R5 ..... 3.95
So.Chicago,Ill. R2 ..... 3.85
SparrowsPoint B2 ..... 3.95
Sterling,Ill.(1) N15 .... 3.85
Struthers,O. Y1 ..... 3.85
Torrance,Calif. C11 .... 4.65

STRUCTURALS
Carbon Steel Stand. Shapes
Aliquippa,Pa. J5 ..... 3.40
Bessemer,Ala. T2 ..... 3.40
Bethlehem,Pa. B2 ..... 3.45
Clairton,Pa. C3 ..... 3.40
Fairfield,Ala. T2 ..... 3.40
Fontana,Calif. K1 ..... 4.00
Gary,Ind. C3 ..... 3.40
Geneva,Utah G1 ..... 3.40
Houston,Tex. S5 ..... 3.80
Ind.Harbor,Ind. I-2 ... 3.40
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.00
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.00
Minnequa,Colo. C10 ... 3.75
Munhall,Pa. C3 ..... 3.40
Niles,Calif.(22) P1 .... 4.02
Phoenixville,Pa. P4 ... 3.30
Portland,Oreg. O4 ..... 3.90
Seattle B3 ..... 4.05
So.Chicago,Ill. C3, W14. 3.40
So.SanFrancisco B3 ... 3.95
Torrance,Calif. C11 ... 4.00
Weirton,W.Va. W6 .... 3.40

Alloy Stand. Shapes
Clairton,Pa. C3 ..... 4.05
Fontana,Calif. K1 ..... 5.25
Munhall,Pa. C3 ..... 4.05
So.Chicago,Ill. C3 ..... 4.05

H.-S. Low-Alloy Stand. Shapes
Aliquippa,Pa. J5 .. ...5.15
Bessemer,Ala. T2 ..... 5.15
Bethlehem,Pa.(14) B2 .. 5.20
Clairton,Pa. C3 ..... 5.15
Fairfield,Ala. T2 ..... 5.15
Fontana,Calif. K1 ..... 5.75
Gary,Ind. C3 ..... 5.15
Ind.Harbor,Ind. I-2, Y1. 5.15
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y.(14)B2 5.20
Munhall,Pa. C3 ..... 5.15
So.Chicago,Ill. C3 ..... 5.15
Struthers,O. Y1 ..... 5.15

Wide Flange
Bethlehem,Pa. B2 ..... 3.45
Lackawanna,N.Y. B2 .. 3.45
Munhall,Pa. C3 ..... 3.40
So.Chicago,Ill. C3 ..... 3.40

H-S., L-A. Wide Flange
Munhall,Pa. C3 ..... 5.10
So.Chicago,Ill., C3 .... 5.10

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ... 4.20
Lackawanna,N.Y. B2 .. 4.20
Munhall,Pa. C3 ..... 4.20
So.Chicago,Ill. C3 ..... 4.20
Weirton,W.Va. W6 .... 4.20

PLATES, Carbon Steel
AlabamaCity,Ala. R2 .. 3.50
Aliquippa,Pa. J5 ..... 3.50
Ashland,Ky.(15) A10 .. 3.50
Bessemer,Ala. T2 ..... 3.50
Clairton,Pa. C3 ..... 3.50
Claymont,Del. W16 .... 3.60
Cleveland J5, R2 ..... 3.50
Coatesville,Pa. L7 .... 3.60
Conshohocken,Pa. A3 .. 3.60
Ecorse,Mich. G5 ..... 3.75
Fairfield,Ala. T2 ..... 3.50
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.50
Geneva,Utah G1 ..... 3.50
Harrisburg,Pa. C5 ..... 3.50
Houston,Tex. S5 ..... 3.90
Ind.Harbor,Ind. I-2, Y1. 3.50
Johnstown,Pa. B2 ..... 3.50
Lackawanna,N.Y. B2 .. 3.50
Minnequa,Colo. C10 ... 4.30
Munhall,Pa. C3 ..... 3.50
Pittsburgh J5 ..... 3.50
Seattle B3 ..... 4.40
Sharon,Pa. S3 ..... 3.50
So.Chicago,Ill. C3, W14. 3.50
SparrowsPoint,Md. B2 .. 3.50
Steubenville,O. W10 ... 3.50
Warren,O. R2 ..... 3.50
Weirton,W.Va. W6 .... 3.50
Youngstown C3, Y1.... 3.50

PLATES (Universal Mill)
Fontana,Calif. K1 .... 4.40

PLATES, Carbon, A.R.
Fontana,Calif. K1 ..... 5.25

PLATES, Open-Hearth Alloy
Coatesville,Pa. L7 ..... 4.50
Conshohocken,Pa. A3 .. 4.40
Fontana,Calif. K1 ..... 5.40
Gary,Ind. C3 ..... 4.40
Johnstown,Pa. B2 ..... 4.40
Munhall,Pa. C3 ..... 4.40
Sharon,Pa. S3 ..... 4.40
So.Chicago,Ill. C3 .... 4.40
SparrowsPoint,Md. B2 .. 4.40

PLATES, Wrought Iron
Economy,Pa. B14 ..... 7.85

PLATES,High-Strength Low-Alloy
Aliquippa,Pa. J5 ..... 5.35
Bessemer,Ala. T2 ..... 5.35
Clairton,Pa. C3 ..... 5.35
Cleveland J5, R2 ..... 5.35
Conshohocken,Pa. A3 .. 5.35
Ecorse,Mich. G5 ..... 5.60
Fairfield,Ala. T2 ..... 5.35
Fontana,Calif. K1 ..... 5.95
Gary,Ind. C3 ..... 5.35
Geneva,Utah G1 ..... 5.35
Houston,Tex. S5 ..... 5.60
Ind.Harbor,Ind. I-2, Y1. 5.35
Johnstown,Pa. B2 ..... 5.35
Munhall,Pa. C3 ..... 5.35
Pittsburgh J5 ..... 5.35
Sharon,Pa. S3 ..... 5.35
So.Chicago,Ill. C3 ..... 5.35
SparrowsPoint,Md. B2 .. 5.35
Warren,O. R2 ..... 5.35
Youngstown Y1 ..... 5.35

FLOOR PLATES
Cleveland J5 ..... 4.55
Conshohocken,Pa. A3 .. 4.55
Harrisburg,Pa. C5 ..... 4.55
Ind. Harbor, Ind. I-2 .. 4.55
Munhall,Pa. C3 ..... 4.55
So.Chicago,Ill. C3 ..... 4.55

PLATES, Ingot Iron
Ashland,c.l.(15) A10 ... 3.75
Ashland,lcl(15) A10 .... 4.25
Cleveland,cl R2 ..... 4.10
Warren,O.,cl R2 ..... 4.10

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 .. 3.45
Aliquippa,Pa. J5 ..... 3.45
Alton,Ill.(1) L1 ..... 3.45
Ashland,Ky.(17) A10 .. 3.45
Atlanta,Ga. A11 ..... 3.60
Bessemer,Ala. T2 ..... 3.45
Buffalo R2 ..... 3.45
Canton,O. R2 ..... 3.45
Clairton,Pa. C3 ..... 3.45
Cleveland R2 ..... 3.45
Ecorse,Mich. G5 ..... 3.65
Emeryville,Calif. J7 .... 4.20
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1. 3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.05
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.15
Marion,O. P11 ..... 3.35
Midland,Pa. C18 ..... 3.45
Milton,Pa. B6 ..... 3.45
Minnequa,Colo. C10 ... 3.85
Niles,Calif. P1 ..... 4.17
N.Tonawanda,N.Y. B11 .3.45
Pittsburg,Calif. C11 ... 4.15
Pittsburgh J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
Seattle B3, N14 ..... 4.20
So.Chicago C3, R2, W14. 3.45
So.Duquesne,Pa. C3 ... 3.45
S.SanFran.,Cal. B3 .... 4.20
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 ... 4.15
Weirton,W.Va. W6 .... 3.45
Youngstown C3, R2 .... 3.45

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ..... 3.45
Atlanta A11 ..... 3.60
Johnstown,Pa. B2 ..... 3.45
Lackawanna,N.Y. B2 .. 3.45
Niles,Calif. P1 ..... 4.17
Pittsburgh(23) J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
SanFrancisco S7 ..... 4.00
Weirton,W.Va. W6 .... 3.45

BAR SIZE ANGLES; H.R.CARBON
Bethlehem,Pa. B2 ..... 3.65

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ..... 3.95
Buffalo R2 ..... 3.95
Canton,O. R2, T7..... 3.95
Clairton,Pa. C3 ..... 3.95
Ecorse,Mich. G5 ..... 4.25
Fontana,Calif. K1 ..... 4.95
Gary,Ind. C3 ..... 3.95
Houston,Tex. S5 ..... 4.35
Ind.Harbor,Ind. I-2, Y1. 3.95
Johnstown,Pa. B2 ..... 3.95
KansasCity,Mo. S5 .... 4.55
Lackawanna,N.Y. B2 .. 3.95
LosAngeles B3 ..... 5.00
Massillon,O. R2 ..... 3.95
Midland,Pa. C18 ..... 3.95
So.Chicago C3, R2, W14. 3.95
So.Duquesne,Pa. C3 ... 3.95
Struthers,O. Y1 ..... 3.95
Warren,O. C17 ..... 3.95
Youngstown C3 ..... 3.95

BARS, Hot-Rolled Ingot Iron
Ashland,Ky.(17) A10 .. 3.70

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 ..... 5.20
Bessemer,Ala. T2 ..... 5.20
Bethlehem,Pa. B2 ..... 5.20
Clairton,Pa. C3 ..... 5.20
Cleveland R2 ..... 5.20
Ecorse,Mich. G5 ..... 5.40
Fairfield,Ala. T2 ..... 5.20
Fontana,Calif. K1 ..... 6.25
Gary,Ind. C3 ..... 5.20
Ind.Harbor,Ind. I-2, Y1. 5.20
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y. B2 .. 5.20
Pittsburgh J5 ..... 5.20
So.Duquesne,Pa. C3 ... 5.20
Struthers,O. Y1 ..... 5.20
Youngstown C3 ..... 5.20

BARS, Cold-Finished Carbon
Aliquippa,Pa. K5 ..... 4.15
Ambridge,Pa. W18 .... 4.15
BeaverFalls,Pa. M12,R2. 4.15
Buffalo B5 ..... 4.15
Camden,N.J. P13 ..... 4.63
Carnegie,Pa. C12 ..... 4.15
Chicago W18 ..... 4.15
Cleveland A7, C20 ..... 4.15
Detroit P17 ..... 4.30
Donora,Pa. A7 ..... 4.15
Ecorse,Mich. G5 ..... 4.35
Elyria,O. W8 ..... 4.15
FranklinPark,Ill. N5 .. 4.15
Gary,Ind. R2 ..... 4.15
Hammond,Ind. L2, M13. 4.15
Hartford,Conn. R2 .... 4.55
Harvey,Ill. B5 ..... 4.15
LosAngeles R2 ..... 5.55
Mansfield,Mass. B5 .... 4.55
Massillon,O. R2, R8 ... 4.15
Midland,Pa. C18 ..... 4.15
Monaca,Pa. S17 ..... 4.15
Newark,N.J. W18 ..... 4.55
Plymouth,Mich. P5 .... 4.40
Pittsburgh J5 ..... 4.10
Putnam,Conn. W18 .... 4.55
Readville,Mass. C14 .... 4.55
St.Louis,Mo. M5 ..... 4.55
So.Chicago,Ill. W14 .... 4.15
SpringCity,Pa.(5) K3 .. 4.55
Struthers,O. Y1 ..... 4.15
Waukegan,Ill. A7 ..... 4.15
Youngstown F3, Y1 .... 4.15

BARS, Cold-Finished Alloy
Aliquippa,Pa. K5 ..... 4.90
Ambridge,Pa. W18 .... 4.90
BeaverFalls,Pa. M12 .. 4.90
Bethlehem,Pa. B2 ..... 4.90
Buffalo B5 ..... 4.90
Canton,O. R2, T7 ..... 4.90
Carnegie,Pa. C12 ..... 4.90
Chicago W18 ..... 4.90
Cleveland A7, C20..... 4.90
Detroit P17 ..... 5.05
Donora,Pa. A7 ..... 4.90
Elyria,O. W8 ..... 4.90
Gary,Ind. R2 ..... 4.90
Hammond,Ind. L2, M13. 4.90
Hartford,Conn. R2 ..... 5.20
Harvey,Ill. B5 ..... 4.90
Lackawanna,N.Y. B2 .. 4.90
Mansfield,Mass. B5 ... 5.20
Massillon,O. R2, R8 ... 4.90
Midland,Pa. C18 ..... 4.90
Monaca,Pa. S17 ..... 4.90
Newark,N.J. W18 ..... 5.20
Plymouth,Mich. P5 .... 5.10
So.Chicago,Ill. R2, W14. 4.90
Struthers,O. Y1 ..... 4.90
Waukegan,Ill. A7 ..... 4.90
Warren,O. C17 ..... 4.90
Worcester,Mass. A7 .... 5.20
Youngstown F3, Y1.... 4.90

RAIL STEEL BARS
ChicagoHts.,Ill.(3) I-2.. 3.30
ChicagoHts.,Ill.(4) I-2.. 3.45
FortWorth,Tex.(26) T4.. 4.33
Huntngtn,W.Va.(3) W7.. 3.45
Moline,Ill.(3) R2 ..... 3.40
Williamsport(2,3) S19 .. 3.45

BARS, Wrought Iron
Economy,Pa.(S.R.) B14. 9.50
Economy,Pa.(D.R.)B14 11.00
Economy(Staybolt) B14. 11.30
McK.Rks.(S.R.) L5 .... 8.60
McK.Rks.(D.R.) L5 ... 11.25
McK.Rks.(Staybolt) L5. 12.75

BARS, Reinforcing (Fabricated; to Consumers)
Huntington,W.Va. W7 .. 4.50
Johnstown, ¼-1" B2 .. 4.35
LosAngeles B3 ..... 5.00
Marion,O. P11 ..... 4.25
Seattle B3, N14 ..... 5.10
So.SanFrancisco B3 ... 5.00
SparrowsPt.,¼-1" B2 .. 4.35
Williamsport,Pa. S19 .. 4.35

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 .. 3.45
Alton,Ill.(6) L1 ..... 3.45
Atlanta,Ga. A11 ..... 3.60
Buffalo R2 ..... 3.45
Cleveland R2 ..... 3.45
Emeryville,Calif. J7 .... 4.20
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1. 3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.05
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.15
Milton,Pa. B6 ..... 3.45
Minnequa,Colo. C10 ... 4.25
Niles,Calif. P1 ..... 4.17
Pittsburg,Calif. C11 ... 4.15
Pittsburgh J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
SandSprings,Okla. S5 .. 4.35
Seattle,Wash. B3, N14.. 4.20
So.Chicago,Ill. R2 .... 3.45
So.Duquesne,Pa. C3 ... 3.45
So.SanFrancisco B3 .... 4.20
SparrowsPoint,Md. B2 .. 3.45
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 .... 4.15
Youngstown C3, R2.... 3.45

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. C3 ..... 4.20
Fontana,Calif. K1 .... 4.95
Gary,Ind. C3 ..... 4.20
Youngstown C3 ..... 4.20

SHEETS, Hot-Rolled Steel (18 gage and heavier)
AlabamaCity,Ala. R2 .. 3.35
Ashland,Ky.(8) A10 ... 3.35
Butler,Pa. A10 ..... 3.35
Cleveland J5, R2 ..... 3.35
Conshohocken,Pa. A3 .. 3.45
Ecorse,Mich.(8) G5 .... 3.55
Fairfield,Ala. T2 ..... 3.35
Fontana,Calif. K1 ..... 4.25
Gary,Ind. C3 ..... 3.35
Ind.Harbor,Ind. I-2, Y1. 3.35
Irvin,Pa. C3 ..... 3.35
Lackawanna,N.Y. B2 .. 3.35
Munhall,Pa. C3 ..... 3.35
Niles,O. N12 ..... 3.50
Niles,O. M4 ..... 3.75
Pittsburg,Calif. C11 ... 4.05
Pittsburgh J5 ..... 3.35
Sharon,Pa. S3 ..... 3.35
So.Chicago,Ill. W14 .... 3.35
SparrowsPoint,Md. B2 .. 3.35
Steubenville,O. W10 ... 3.35
Torrance,Calif. C11 .... 4.05
Warren,O. R2 ..... 3.35
Weirton,W.Va. W6 .... 3.35
Youngstown C3, Y1 .... 3.35

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)
AlabamaCity,Ala. R2 .. 4.50
Dover,O. R1 ..... 4.65
Ind.Harbor,Ind. I-2 .... 4.40
Mansfield,O. E6 ..... 4.15
Niles,O. N12 ..... 4.10
Niles,O. M4 ..... 4.65
Torrance,Calif. C11 .... 5.15

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 ..... 5.05
Conshohocken,Pa. A3 .. 5.05
Ecorse,Mich. G5 ..... 5.25
Fairfield,Ala. T2 ..... 5.05
Fontana,Calif. K1 ..... 6.74
Gary,Ind. C3 ..... 5.05
Ind.Harbor,Ind. I-2, Y1. 5.05
Irvin,Pa. C3 ..... 5.05
Lackawanna(35) B2 ... 5.05
Pittsburgh J5 ..... 5.05
Sharon,Pa. S3 ..... 5.05
So.Chicago,Ill. C3 ..... 5.05
SparrowsPoint(36) B2 .. 5.05
Warren,O. R2 ..... 5.05
Weirton,W.Va. W6 .... 5.05
Youngstown C3, Y1 ... 5.05

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2..... 6.20
Ecorse,Mich. G5 ..... 6.40
Fontana,Calif. K1 ..... 7.10
Gary,Ind. C3 ..... 6.20
Ind.Harbor,Ind. I-2, Y1. 6.20
Irvin,Pa. C3 ..... 6.20
Lackawanna(37) B2 ... 6.20
Pittsburgh J5 ..... 6.20
Sharon,Pa. S3 ..... 6.20
SparrowsPoint(38) B2 .. 6.20
Warren,O. R2 ..... 6.20
Weirton,W.Va. W6 .... 6.20
Youngstown Y1 ..... 6.20

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.10
Cleveland J5, R2	4.10
Ecorse,Mich. G5	4.30
Fairfield,Ala. T2	4.10
Follansbee,W.Va. F4	4.10
Fontana,Calif. K1	5.00
Gary,Ind. C3	4.10
GraniteCity,Ill. G4	4.30
Ind.Harbor,Ind. I-2, Y1	4.10
Irvin,Pa. C3	4.10
Lackawanna,N.Y. B2	4.10
Middletown,O. A10	4.10
Pittsburg,Calif. C11	5.05
Pittsburgh J5	4.10
SparrowsPoint,Md. B2	4.10
Steubenville,O. W10	4.10
Warren,O. R2	4.10
Weirton,W.Va. W6	4.10
Youngstown Y1	4.10

SHEETS, Gal'zd No. 10 Steel

AlabamaCity,Ala. R2	4.40
Ashland,Ky.(8) A10	4.40
Canton,O. R2	4.40
Delphos,O. N16	5.15
Dover,O. R1	4.75
Fairfield,Ala. T2	4.40
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Kokomo,Ind. C16	4.50
MartinsFerry,O. W10	4.40
Niles,O. N12	4.65
Pittsburg,Calif. C11	5.15
SparrowsPoint,Md. B2	4.40
Steubenville,O. W10	4.40
Torrance,Calif. C11	5.15
Weirton,W.Va. W6	4.40

SHEETS, Galvanized No. 10, High-Strength Low Alloy

Irvin,Pa. C3	6.75
SparrowsPoint(39) B2	6.75

SHEETS, Gavannealed Steel

Canton,O. R2	4.95
Irvin,Pa. C3	4.95
Kokomo,Ind. C16	5.05
Niles,O. N12	5.20

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	4.65
Middletown,O. A10	4.65

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.25
Niles,O. R2 (28)	5.25
Weirton,W.Va. W6	5.10

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.05

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va. W10	4.80
Gary,Ind. C3	4.80
Mansfield,O. E6	4.80
Middletown,O. A10	4.80
Niles,O. N12	4.80
Weirton,W.Va. W6	4.80

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.20

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3	$17.50
Yorkville, O. W10	17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$6.60
Gary,Ind. C3	6.50
Ind.Harbor I-2	6.50
Irvin,Pa. C3	6.50
Yorkville,O. W10	6.50

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10	$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3	$8.10
Warren,O. R2	8.10
Yorkville,O. W-10	8.10

SHEETS, Coated Ternes, 12 lb

Yorkville,O. W10	8.95

SHEETS, Culvert, No. 16

	Cu Alloy	Cu Fe
Ashland A10	5.20	...
Canton,O. R2	5.25	5.70
Fairfield,Ala. T2	5.20	5.45
Gary C3	5.20	5.45
IndianaHarbor I-2	5.20	5.45
Irvin,Pa. C3	5.20	5.45
Kokomo C16	5.40	...
MartinsFy,O. W10	5.20	5.45
Pittsburg,Cal. C11	5.95	...
SparrowsPt. B2	5.20	...
Torrance,Cal. C11	5.95	...

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

Ashland,Ky. A10	5.45

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10	3.60
Cleveland R2	3.95
Ind.Harbor,Ind. I-2	3.60
Warren,O. R2	3.95

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2	4.70
Middletown,O. A10	4.60
Warren,O. R2	4.70

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10	4.65
Canton,O. R2	5.15
Ind.Harbor,Ind. I-2	4.80

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	4.90
Middletown,O. A10	4.90

SHEETS,Well Casing

Torrance,Calif. C11	4.85

SHEETS, Drum Body

Pittsburg,Calif. C11	4.05
Torrance,Calif. C11	4.05

SHEETS, Aluminized

Butler,Pa. A10	7.75

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.35	$6.60	$6.85
Fairfield,Ala. T2	6.45	6.70	6.95
Gary,Ind. C3	6.35	6.60	6.85
GraniteCity,Ill. G4	6.55	6.80	7.05
Ind.Harbor,Ind. I-2, Y1	6.35	6.60	6.85
Irvin,Pa. C3	6.35	6.60	6.85
Niles,O. R2	6.35	6.60	6.85
Pittsburg,Calif. C11	7.10	7.35	7.60
SparrowsPoint,Md. B2	6.45	6.70	6.95
Weirton,W.Va. W6	6.35	6.60	6.85
Yorkville,O. W10	6.35	6.60	6.85

SHEETS, SILICON, H.R. or C.R. (22 Ga.) Coils (Cut Lengths ½c lower)

	Field	Armature	Electric	Motor	Dynamo
BeechBottom W10 (cut lengths)	...	...	*6.70*	*7.95*	*8.75*
Brackenridge,Pa. A4	...	...	*7.20*	*8.45*	*9.25*
Follansbee F4 (cut length)	...	...	6.95	7.95	8.75
GraniteCity,Ill. G4	...	...	7.65	8.65	...
Ind.Harbor,Ind. I-2	6.40	6.70	(34)	...	...
Mansfield,O. E6 (cut lengths)	5.90	6.20	6.70	7.95	8.75
Niles,O. N12 (cut lengths)	...	*6.20*	*6.70*	...	...
Niles,O. M4 (24 Gage)	5.65	5.95	6.45	...	...
Vandergrift,Pa. C3	...	6.70	7.20	8.45	9.25
Warren,O. R2	6.40	6.70	7.20	8.45	9.25
Zanesville,O. A10	...	6.70	7.20	8.45	9.25

SHEETS, SILICON (22 Gage Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	*9.30*	*9.85*	*10.55*	*11.35*
Brackenridge,Pa. A4	9.80	10.35	11.05	....
Follansbee F4 (cut length)	9.30	9.85	10.55	11.35
Vandergrift,Pa. C3	9.80	10.35	11.05	11.85
Warren,O. R2	9.80	....	....	....
Zanesville,O. A10	9.80	10.35	11.05	11.85

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)

	T-100	T-90	T-80
Vandergrift,Pa. C3	12.35	13.20	14.20

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$7.30	$7.50
Fairfield,Ala. T2	7.40	7.60
Gary C3	7.30	7.50
Gran.City,Ill. G4	7.50	7.70
Ind.Harbor I-1, Y1	7.30	7.50
Irvin,Pa. C3	7.30	7.50
Pitts.Cal. C11	8.05	8.25
Sp.Pt.,Md. B2	7.40	7.60
Warren R2	7.30	7.50
Weirton W6	7.30	7.50
Yorkville,O. W10	7.30	7.50

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$5.60
Fairfield,Ala. T2	5.70
Gary,Ind. C3	5.60
GraniteCity,Ill. G4	5.80
Ind.Harbor,Ind. I-2, Y1	5.60
Irvin,Pa. C3	5.60
Niles,O. R2	5.60
Pittsburg,Calif. C11	6.35
SparrowsPoint,Md. B2	5.70
Warren,O. R2	5.60
Weirton,W.Va. W6	5.60
Yorkville,O. W10	5.60

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5	5.30
Follansbee,W.Va. F4	5.30
Gary,Ind. C3	5.30
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. C3	5.30
Niles,O. R2	5.30
SparrowsPoint,Md. B2	5.40
Warren,O. R2	5.30
Yorkville,O. W10	5.30

SHEETS, Enam'lg. Iron

Ashland,Ky.(8) A10	4.40
Cleveland R2	4.40
Ecorse,Mich. G5	4.70
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Middletown,O. A10	4.40
Niles,O. M4	4.90
Youngstown Y1	4.40

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	4.95
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Cal. K1	6.64
Gary,Ind. C3	4.95
Ind.Harb.,Ind. I-2, Y1	4.95
Lackawanna,N.Y. B2	4.95
Sharon,Pa. S3	4.95
SparrowsPoint,Md. B2	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.10
Carnegie,Pa. S18	5.10
Fontana,Calif. K1	6.30
Gary,Ind. C3	5.10
Houston,Tex. S5	5.50
KansasCity,Mo. S5	5.70
NewBritn,Conn.(10) S15	5.10
Sharon,Pa. S3	5.10
Youngstown C3	5.10

STRIP,Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.50
Warren,O. R2	3.85

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1	3.25
Ashland,Ky.(8) A10	3.25
Atlanta A11	3.40
Bessemer,Ala. T2	3.25
Bridgeprt,Conn.(10) S15	3.25
Butler,Pa. A10	3.25
Carnegie,Pa. S18	3.25
Conshohocken,Pa. A3	3.35
Detroit M1	*3.45*
Ecorse,Mich. G5	3.45
Fairfield,Ala. T2	3.25
Fontana,Calif. K1	4.40
Gary,Ind. C3	3.25
Houston,Tex. S5	3.65
Ind.Harbor,Ind. I-2, Y1	3.25
KansasCity,Mo.(9) S5	3.85
Lackawanna,N.Y. B2	3.25
LosAngeles B3	4.00
Milton,Pa. B6	3.25
Minnequa,Colo. C10	4.30
NewBritain(10) S15	3.25
N.Tonawanda,N.Y. B11	3.25
Pittsburg,Calif. C11	4.00
Riverdale,Ill. A1	3.25
SanFrancisco S7	3.90
Seattle B3, N14	4.25
Sharon,Pa. S3	3.25
So.Chicago,Ill. W14	3.25
So.SanFrancisco B3	4.00
SparrowsPoint,Md. B2	3.25
Torrance,Calif. C11	4.00
Warren,O. R2	3.25
Weirton,W.Va. W6	3.25
WestLeechburg,Pa. A4	3.25
Youngstown C3, Y1	3.25

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15	9.50
Carnegie,Pa. S18	9.50
Cleveland A7	9.50
Dover,O. G6	9.50
Harrison,N.J. C18	9.80
NewBritn,Conn.(10) S15	9.50
Pawtucket,R.I.(11) N8	9.50
Pawtucket,R.I.(12) N8	9.80
Sharon,Pa. S3	9.50
Worcester,Mass. A7	9.80
Youngstown C8	9.50

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	4.75

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	4.15
Berea,O. C7	6.60
Bridgeprt,Conn.(10) S15	4.15
Butler,Pa. A10	4.15
Cleveland A7, J5	4.15
Dearborn,Mich. D3	4.40
Detroit, D2	4.40
Detroit M1	4.35
Dover,O.(40) G6	4.15
Ecorse,Mich. G5	4.35
Follansbee,W.Va. F4	4.15
Fontana,Calif. K1	5.40
FranklinPark,Ill. T6	4.30
Ind.Harbor,Ind. I-2	4.30
Lackawanna,N.Y. B2	4.15
LosAngeles C1	5.50
Mattapan,Mass.(21) T6	4.65
Middletown,O. A10	4.15
NewBritain(10) S15	4.15
NewCastle,Pa. B4, E5	4.15
NewHaven,Conn. A7, D2	4.65
NewYork W3	5.00
Pawtucket,R.I.(11) N8	4.70
Pawtucket,R.I.(21) N8	4.65
Riverdale,Ill. A1	4.30
Sharon,Pa.(30) S3	4.15
SparrowsPoint,Md. B2	4.15
Trenton,N.J. (13) R5	4.65
Wallingford,Conn. W2	4.65
Warren,O.(25) T5	4.15
Warren,O. R2	4.15
Weirton,W.Va. W6	4.15
Youngstown C8, Y1	4.15

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5	6.20
Dover,O. G6	6.20
Ecorse,Mich. G5	6.40
Fontana,Calif. K1	6.95
Lackawanna,N.Y., B2	6.40
Sharon,Pa. S3	6.20
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.20
Weirton,W.Va. W6	6.20
Youngstown Y1	6.20

STRIP, Electro Galvanized

Weirton,W.Va. W6	4.15
Youngstown C8	4.15

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.25-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Bridgeport,Conn.(10) S15	4.15	5.95	6.55	8.50	10.80
Bristol,Conn. W1	...	...	6.40	8.35	....
Carnegie,Pa. S18	...	5.95	6.55	8.50	10.80
Cleveland A7	4.15	5.95	6.55	8.50	10.80
Dover,O. G6	4.15	5.95	6.55	8.50	10.80
FranklinPark,Ill. T6	4.40	6.10	6.70	8.65	....
Harrison,N.J. C18	...	...	6.85	8.80	11.10
Mattapan,Mass. T6	4.65	6.25	6.85	8.80	11.10
NewBritn.,Conn.(10) S15	4.15	5.95	6.55	8.50	10.80
NewCastle,Pa. B4	4.15	5.95	6.55	8.50	....
NewCastle,Pa. E5	4.15	5.95	6.55	8.50	10.80
NewYork W3	...	6.30	6.90	8.85	11.15
Pawtucket,R. I. N8: Cleve.orPitts.Base (29)	4.55	5.50	6.10	8.05	10.35
Worcester,Base (29)	4.50	5.80	6.40	8.35	10.65
Sharon,Pa. S3	4.15	5.95	6.55	8.50	10.80
Trenton,N.J. R5	...	6.25	6.85	8.80	11.10
Wallingford,Conn. W2	4.65	6.25	6.85	8.80	11.10
Weirton,W.Va. W6	4.15	5.95	6.55	8.50	10.80
Worcester,Mass. A7	4.45	6.25	6.85	8.80	11.10
Worcester,Mass. T6	4.65	6.25	6.85	8.80	11.10
Youngstown C8	4.50	5.50	6.10	8.05	10.35

Spring Steel (Tempered)

Trenton,N.J. R5	...	...	*9.30*	*11.25*	*13.85*

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel&Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B14 A. M. Byers Co.

C1 Calif. Cold Rolled Steel
C3 Carnegie-Illinois Steel
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Clev. Cld.Roll.MillsCo.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Son, Henry
D6 Driver-Harris Co
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F6 Fretz-Moon Tube Co.

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H4 Heppenstall Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K5 Kidd Drawn Steel Co.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

UNIVERSITY OF MICHIGAN LIBRARIES

TIGHT COOPERAGE HOOP

Atlanta A11	3.60
Riverdale,Ill. A1	3.60
Sharon,Pa. S3	3.60
Youngstown C3	3.60

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.90
Bartonville,Ill.(1) K4	5.90
Buffalo W12	5.90
Cleveland A7	5.90
Donora,Pa. A7	5.90
Duluth A7	5.90
Fostoria,O. S1	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Milbury,Mass(12) N6	6.20
Monessen,Pa. P7	5.90
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Struthers,O. Y1	5.90
Trenton,N.J., A7	6.20
Waukegan,Ill. A7	5.90
Worcester A7,J4,T6,W12	6.20

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	5.35
Buffalo W12	5.35
Cleveland A7	5.35
Dover,O. G6	5.35
Fostoria,O. S1	5.50
Kokomo,Ind. C16	5.35
FranklinPark,Ill. T6	5.70
Massillon,O. R8	5.35
Monessen,Pa. P7	5.35
Pawtucket,R.I.(11) N8	5.70
Pawtucket,R.I.(12) N8	5.65
Trenton,N.J. R5	5.65
Worcester A7, T6, W12	5.65

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(1) K4	8.45
Buffalo W12	8.45
Chicago W13	8.45
Cleveland A7	8.45
Crawfordsville,Ind M8	8.60
Fostoria,O. S1	8.45
Johnstown,Pa. B2	7.70
Kokomo,Ind. C16	8.45
Palmer,Mass. W12	8.75
Portsmouth,O. P12	8.45
Roebling,N.J. R5	8.75
Waukegan,Ill. A7	8.45
Worcester,Mass. A7, T6	8.75

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity,Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Atlanta A11	4.60
Alton,Ill.(1) L1	4.50
Bartonville,Ill.(1) K4	4.50
Buffalo W12	4.50
Chicago W13	4.50
Cleveland A7, C20	4.50
Crawfordsville,Ind. M8	4.65
Donora,Pa. A7	4.50
Duluth A7	4.50
Fairfield,Ala. T2	4.50
Fostoria,O.(24) S1	4.85
Houston S5	4.90
Johnstown,Pa. B2	4.50
Joliet,Ill. A7	4.50
KansasCity,Mo. S5	5.10
Kokomo,Ind. C16	4.60
LosAngeles B3	5.45
Minnequa,Colo. C10	4.75
Monessen,Pa. P7	4.50
Newark,6-8ga. I-1	5.15
No.Tonawanda B11	4.90
Palmer,Mass. W12	4.80
Pittsburg,Calif. C11	5.45
Portsmouth,O. P12	4.50
Rankin,Pa. A7	4.50
So.Chicago,Ill. R2	4.50
So.SanFrancisco C10	5.45
SparrowsPoint,Md. B2	4.60
Sterling,Ill.(1) N15	4.50
Struthers,O. Y1	4.50
Torrance,Calif. C11	5.45
Waukegan,Ill. A7	4.50
Worcester,Mass. A7, T6	4.80

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	5.55
Buffalo W12	5.55
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Johnstown,Pa. B2	5.55
LosAngeles B3	6.50
Monessen P7	5.55
NewHaven,Conn. A7	5.85
Palmer,Mass. W12	5.85
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	5.55
Roebling,N.J. R5	5.85
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	5.65
Struthers,O. Y1	5.55
Torrance,Calif. C11	6.50
Trenton,N.J. A7	5.85
Waukegan,Ill. A7	5.55
Worcester,Mass. A7	5.85

ROPE WIRE	Mild Plow	Plow	Imp. Plow
Bartonville,Ill. K4	8.05	8.05	8.30
Buffalo W12	8.05	8.05	8.30
Cleveland A7	8.05	8.05	8.30
Donora,Pa. A7	8.05	8.05	8.30
Fostoria,O. S1	8.05	8.05	8.30
Johnstown,Pa. B2	7.50	7.80	8.20
Monessen,Pa. P7	8.05	8.05	8.30
NewHaven,Conn. A7	8.35	8.35	8.60
Palmer,Mass. W12	8.05	8.05	8.30
Portsmouth,O. P12	8.05	8.05	8.30
Roebling,N.J. R5	8.35	8.35	8.60
SparrowsPoint,Md. B2	7.60	7.90	8.30
Struthers,O. Y1	8.05	8.05	8.30
Trenton,N.J. A7	8.35	8.35	8.60
Waukegan,Ill. A7	8.05	8.05	8.30
Williamsport,Pa. B2	7.60	7.90	8.30
Worcester,Mass. J4, T6	8.35	8.35	8.60

WIRE, Merchant Quality (6 to 8 gage)

	An'ld Galv.	
AlabamaCity R2	5.35	5.60
Aliquippa J5	5.35	5.60
Atlanta A11	5.45	5.70
Bartonville(19) K4	5.35	5.60
Buffalo(31) W12	4.50	...
Cleveland A7	5.35	5.60
Crawfrdsvil. M8	5.50	5.75
Donora A7	5.35	5.60
Duluth A7	5.35	5.60
Fairfield T2	5.35	5.60
Houston,Tex. S5	5.75	6.00
Johnstown B2	5.35	5.60
Joliet,Ill. A7	5.35	5.60
KansasCy,Mo. S5	5.95	6.20
Kokomo C16	5.45	5.70
LosAngeles B3	6.30	...
Minnequa C10	5.60	5.85
Monessen P7	5.35	5.60
Palmer(31) W12	4.80	...
Pitts.,Cal. C11	6.30	6.55
Prtsmth.(18) P12	5.35	5.60
Rankin A7	5.35	5.60
So.Chicago R2	5.35	5.60
So.S.Fran. C10	6.30	6.55
SparrowsPt. B2	5.45	5.70
Sterling,Ill.(1)N15	5.35	5.60
Struthers,O. Y1	5.35	5.60
Torrance,Cal. C11	6.30	...
Worcester A7	5.65	5.90

WIRE (16 gage)	An'ld. Galv. Stone	Galv. Stone
Aliquippa J5	9.80	11.30
Bartonville(1) K4	9.80	11.30
Cleveland A7	9.80	11.30
Crawfrdsvil M8	9.95	11.45
Fostoria,O. S1	9.90	11.40
Johnstown B2	9.80	11.30
Kokomo C16	9.80	11.30
Minnequa C10	9.40	10.90
Palmer,Mass. W12	9.35	10.85
Pitts.,Cal. C11	10.15	11.65
Prtsmth.(18) P12	9.80	11.30
SparrowsPt. B2	9.90	11.40
Waukegan A7	9.80	11.30

WIRE, Galv'd ACSR for Cores

Roebling,N.J. R5	8.45

WIRE, Tire Bead

Roebling,N.J. R5	10.80

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	126
Aliquippa,Pa. J5	126
Atlanta A11	128
Bartonville,Ill.(19) K4	126
Crawfordsville M8	129
Donora,Pa. A7	126
Duluth,Minn. A7	126
Fairfield,Ala. T2	126
Houston,Tex. S5	134
Johnstown,Pa. B2	126
Joliet,Ill. A7	126
KansasCity,Mo. S5	138
Kokomo,Ind. C16	128
Minnequa,Colo. C10	131
Monessen,Pa. P7	126
Pittsburg,Calif. C11	146
Portsmouth,O.(18) P12	126
Rankin,Pa. A7	126
So.Chicago,Ill. R2	126
So.San.Fran.,Calif. C10	146
SparrowsPoint,Md. B2	128
Sterling,Ill.(1) N15	126

FENCE POSTS — Col.

Duluth A7	116
Huntington,W.Va. W7	116
Johnstown,Pa. B2	112
Joliet,Ill. A7	116
Minnequa,Colo. C10	121
Moline,Ill. R2	112
So.Chicago R2	116
Williamsport,Pa. S13	120

WOVEN FENCE,9-15½Ga. — Col.

AlabamaCity,Ala. R2	116
Ala.City,Ala.,17-18ga.R2	198
Aliquip.,Pa.9-14½ga. J5	116
Atlanta A11	118
Bartonville,Ill.(19) K4	116
Crawfordsville,Ind. M8	119
Donora,Pa. A7	116
Duluth A7	116
Houston,Tex. S5	124
Fairfield,Ala. T2	116
Johnstown,Pa. B2	116
Johnstn,17ga.,6" B2	190
Johnstn,17ga.,4" B2	193
Joliet,Ill. A7	116
KansasCity,Mo. S5	128
Kokomo,Ind. C16	118
Minnequa,Colo. C10	121
Monessen,Pa. P7	116
Pittsburg,Calif. C11	139
Portsmouth,O.(18) P12	116
Rankin,Pa. A7	116
So.Chicago,Ill. R2	116
Sterling,Ill.(1) N15	116

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	113
Atlanta A11	114
Bartonville,Ill.(19) K4	113
Chicago W13	113
Crawfordsville M8	116
Donora,Pa. A7	113
Duluth A7	113
Fairfield,Ala. T2	113
Joliet,Ill. A7	113
KansasCity,Mo. S5	125
Kokomo,Ind. C16	115
Minnequa,Colo. C10	118
Pittsburg,Calif. C11	137
Portsmouth,O.(18) P12	113
So.Chicago,Ill. R2	113
So.SanFran.,Calif. C10	137
SparrowsPoint,Md. B2	115
Sterling,Ill.(1) N15	113

NAILS & STAPLES, Stock To Dealers & Mfrs. (7) — Col.

AlabamaCity,Ala. R2	106
Aliquippa,Pa. J5	106
Atlanta A11	108
Bartonville,Ill.(19) K4	106
Chicago,Ill. W13	106
Cleveland A9	112
Crawfordsville,Ind. M8	109
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Galveston,Tex. D7	114
Houston,Tex. S5	114
Johnstown,Pa. B2	106
Joliet,Ill. A7	106
KansasCity,Mo. S5	118
Kokomo,Ind. C16	108
Minnequa,Colo. C10	111
Monessen,Pa. P7	106
Pittsburg,Calif. C11	125
Portsmouth,O. P12	106
Rankin,Pa. A7	106
So.Chicago,Ill. R2	106
SparrowsPoint,Md. B2	108

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. C3	3.40	3.30	3.35	3.75
Ensley,Ala. T2	3.40	3.30	...	3.75
Fairfield,Ala. T2	...	...	...	3.75
Gary,Ind. C3	3.40	3.30	3.35	...
Huntington,W.Va. W7	...	...	...	3.75
Ind.Harbor,Ind. I-2	3.40	3.30	3.35	...
Johnstown,Pa. B2	...	...	...(16)	3.75
Lackawanna B2	3.40	3.30	...	3.75
Minnequa,Colo. C10	3.40	3.30	...	4.25
Steelton,Pa. B2	3.40	3.30	...	...

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa.	A3..$6.75
Wheeling,W.Va.	W10 ..6.75

AXLES

Fairfield,Ala. T2	5.25
Gary,Ind. C3	5.25
Ind.Harbor,Ind. S13	5.25
Johnstown,Pa. B2	5.25
McKeesRocks,Pa. C3	5.25

TIE PLATES

Fairfield,Ala. T2	4.20
Gary,Ind. C3	4.20
Ind.Harbor,Ind. I-2	4.20
Lackawanna,N.Y. B2	4.20
Minnequa,Colo. C10	4.20
Pittsburg,Calif. C11	4.35
Pittsburgh R2	4.20
Seattle B3	*4.35*
Steelton,Pa. B2	4.20
Torrance,Calif. C11	4.35
Weirton,W.Va. W6	4.20

JOINT BARS

Bessemer,Pa. C3	4.40
Fairfield,Ala. T2	4.40
Ind.Harbor,Ind. I-2	4.40
Joliet,Ill. C3	4.40
Lackawanna,N.Y. B2	4.40
Minnequa,Colo. C10	4.40
Steelton,Pa. B2	4.40

TRACK BOLTS (20) Treated

Fairfield,Ala. T2	9.10
KansasCity,Mo. S5	9.10
Lebanon,Pa.(32) B2	8.85
Minnequa,Colo. C10	8.60
Pittsburgh O3, P14	9.10
Seattle B3	9.35

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.60
Ind.Harbor,Ind. I-2, Y1	5.60
KansasCity,Mo. S5	5.85
Lebanon,Pa. B2	5.60
Minnequa,Colo. C10	5.60
Pittsburgh J5	5.60
Seattle B3	6.10
So.Chicago,Ill. R2	5.60
Struthers,O. Y1	5.60
Youngstown R2	5.60
Sterling,Ill.(1) N15	106
Torrance,Calif. C11	126
Worcester,Mass. A7	112

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	5.35
Bartonville,Ill.(19) K4	5.35
Crawfordsville,Ind. M8	5.50
Donora,Pa. A7	5.35
Duluth A7	5.35
Johnstown,Pa. B2	5.35
Joliet,Ill. A7	5.35
Kokomo,Ind. C16	5.45
Minnequa,Colo. C10	5.60
Pittsburg,Calif. C11	6.30
Portsmouth,O. P12	5.35
Rankin,Pa. A7	5.35
So.Chicago,Ill. R2	5.35
SparrowsPoint,Md. B2	5.45
Worcester,Mass. A7	5.65

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa.	A3..$6.75
Wheeling,W.Va.	W10 ..6.75

AXLES

Fairfield,Ala. T2	5.25
Gary,Ind. C3	5.25
Ind.Harbor,Ind. S13	5.25
Johnstown,Pa. B2	5.25
McKeesRocks,Pa. C3	5.25

TIE PLATES

Fairfield,Ala. T2	4.20
Gary,Ind. C3	4.20
Ind.Harbor,Ind. I-2	4.20
Lackawanna,N.Y. B2	4.20
Minnequa,Colo. C10	4.20
Pittsburg,Calif. C11	4.35
Pittsburgh R2	4.20
Seattle B3	*4.35*
Steelton,Pa. B2	4.20
Torrance,Calif. C11	4.35
Weirton,W.Va. W6	4.20

JOINT BARS

Bessemer,Pa. C3	4.40
Fairfield,Ala. T2	4.40
Ind.Harbor,Ind. I-2	4.40
Joliet,Ill. C3	4.40
Lackawanna,N.Y. B2	4.40
Minnequa,Colo. C10	4.40
Steelton,Pa. B2	4.40

TRACK BOLTS (20) Treated

Fairfield,Ala. T2	9.10
KansasCity,Mo. S5	9.10
Lebanon,Pa.(32) B2	8.85
Minnequa,Colo. C10	8.60
Pittsburgh O3, P14	9.10
Seattle B3	9.35

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.60
Ind.Harbor,Ind. I-2, Y1	5.60
KansasCity,Mo. S5	5.85
Lebanon,Pa. B2	5.60
Minnequa,Colo. C10	5.60
Pittsburgh J5	5.60
Seattle B3	6.10
So.Chicago,Ill. R2	5.60
Struthers,O. Y1	5.60
Youngstown R2	5.60

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	21.00	18W,4Cr,3V	126.00
Extra Carbon	24.50	18W,4Cr,2V,9Co	185.50
Spec. Carbon	29.50	18W,4Cr,2V,6Co	169.50
Oil Hardening	32.00	18.25W,4.25Cr,1V,4.75Co	156.50
Cr Hot Wrk.	32.00	20.25W,4.25Cr,1.6V.12.25Co	293.50
Hi-Carbon-Cr	57.50	1.5W,4Cr,1V,8.5Mo	71.50
18W,4Cr,1V	100.00	6.4W,4.5Cr,1.9V,5Mo	76.50
18W,4Cr,2V	113.00	6W,4Cr,3V,6Mo	97.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, M14, R2, S8, T7, U4, V2, V3.

Key to Producing Companies

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M10 Missouri-Illinois Furnace
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 New EngHighCarb. Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg.Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills.

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,EatonMfg.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.

T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.

U4 Universal Cyclops Steel
V2 Vanadium Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Wstrn.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstwn Sheet & Tube

(1) Chicago Base. (2) Angles. (3) Merchant. (4) Reinforcing. (5) Philadelphia del. (6) Chicago or Birm. Base. (7) To jobbers, 3 cols. lower. (8) 16 gage and heavier. (9) 6 in. and narrower. (10) Pittsburgh Base. (11) Cleveland & Pittsburgh Base. (12) Worcester, Mass. Base. (13) 3"& wider; over ½" to under 3" 5.15c. (14) Also wide flange beams. (15) ½" and thinner. (16) 40 lb and under. (17) Flats only. (18) To dealers. (19) Chicago & Pittsburgh Base. (20) Deduct 0.25c for untreated. (21) New Haven, Conn. Base. (22) Del. San Fran. Bay area. (23) Angles 1"x1" to 1¼"x1¼" only. (24) Deduct 0.35c for finer than 15 Ga. (25) Up to 0.035 C; 4.40c, 0.035 C and over. (26) Reinforcing, mill shipments; to consumers, 4.83c; fabricated to fabricators, 4.58c. (28) Bonderized. (29) 0.26-0.40 C. (30) 0.40 C and less. (31) Not annealed. (32) Untreated. (33) To jobbers, deduct 20 cents. (34) 6.70c for cut lengths. (35) 72" and narrower. (36) 54" and narrower. (37) 15 Ga. & lighter; 60" & narrower. (38) 14 Ga. & lighter; 48" & narrower. (39) 48" and narrower. (40) Lighter than 0.035"; 4.40c, 0.035" and heavier.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.5c	0.24	36.5	34.5	35.5	8.5	9	7.5
¼	6.0	0.42	33.5	31.5	32.5	9.5	11	8.5
⅜	6.0	0.57	29	27	28	5.5	8	4.5
½	8.5	0.85	40.5	38.5	39.5	24.0	22.0	23.0
¾	11.5	1.13	43.5	41.5	42.5	28.0	26.0	27.0
1	17.0	1.68	46.0	44.0	45.0	31.0	29.0	30.0
1¼	23.0	2.28	46.5	44.5	45.5	31.5	29.5	30.5
1½	27.5	2.73	47.0	45.0	46.0	32.0	30	31.0
2	37.0	3.68	47.5	45.5	46.5	32.5	30.5	31.5
2½	58.5	5.82	48.0	46.0	47.0	33.0	31.0	32.0
3	76.5	7.62	48.0	46.0	47.0	33.0	31.0	32.0

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 1½ percentage points lower on ⅛", 2 points lower on ¼", 3 points lower on ⅜", W10. Wheatland, Pa., 2 pts lower on ⅛" through ⅜",W9. Following make ½" and larger: Lorain, O. N3; Youngstown, plus 42% on 3½" and 4", R2; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 31% on 3½" and 4".

Columns B & E: Sparrows Point Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y-1; Alton, Ill. (Lorain, O., base) L1.

Column D: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛" through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜" W10. Wheatland, Pa., except 2 pts lower on ¼" through ⅜", W9. Following make ½" and larger: Lorain N3; Youngstown, plus 26.5% on 3½" and 4", R2; Youngstown, Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 15.5% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	36.0	20.5	36.0	20.5
2½	58.5	5.82	39.0	23.5	39.0	23.5
3	76.5	7.62	39.0	23.5	39.0	23.5
3½	92.0	9.20	41.0	25.5	41.0	25.5
4	$1.09	10.89	41.0	25.5	41.0	25.5
5	1.48	14.81	41.0	25.5	41.0	25.5
6	1.92	19.18	41.0	25.5	41.0	25.5

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft. inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	12.36	14.39	13.96	13.96
1¼	13	14.63	17.05	14.19	16.54
1½	13	16.17	19.02	15.68	18.45
1⅝	13	18.39	21.64	17.84	20.99
2	13	20.61	24.24	19.99	23.51
2¼	13	22.96	27.03	22.27	26.22
2¼	12	25.29	29.76	24.53	28.87
2½	12	27.71	32.58	26.88	31.60
2⅝	12	29.36	34.53	28.48	33.49
3	12	30.82	36.27	29.90	35.18
3¼	11	35.87	42.22	34.79	40.95
3½	11	38.52	45.35	37.36	43.99
4	10	47.82	56.25	46.39	54.56
4½	9	63.37	74.59	61.47	72.35
5	9	73.37	86.32	71.17	83.73
6	7	112.62	132.51	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(Cents per pound)

Cladding Stainless	Plates Carbon Base 10%	Plates Carbon Base 20%	Strip Cold-Rolled Carbon Base 10%	Strip Cold-Rolled Carbon Base Both sides	Sheets Carbon Base 10%	Sheets Carbon Base 20%	Copper Base Both Sides
302	....	....	....	....	19.75	21.50–22.50	75.00
304	22.50	26.50	....	....	20.75	22.50–24.00	77.00
305	....	....	....	....	....	....	79.00
309	27.00	31.00	....	....	....	....	....
310	32.50	36.50	....	....	....	....	105.00
316	27.00	31.00	....	....	26.00	28.00–32.00	....
317	30.50	34.50	....	....	....	....	....
318	29.50	33.50	....	....	....	....	....
321	23.50	27.50	....	....	23.00	25.00	90.00
347	25.00	29.00	....	....	24.00	26.00–30.00	94.00
405	18.75	24.75	....	....	....	....	....
410	18.25	24.25	....	....	....	....	....
430	18.25	24.25	....	....	....	....	....
Nickel	27.50	34.50	31.50	41.00	....	....	88.00
Inconel	36.00	46.00	....	....	....	....	115.00
Monel	29.00	37.00	26.50	33.50	....	....	83.00
Copper*	....	....	19.75†	23.75†	....	....	....

* Dexodized. † Deduct 4.25c for hot-rolled. Production points for carbon base products: Stainless plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville L7; nickel, monel and copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants: per cent off list for less than case lots to consumers)

6 in. and shorter:	
½-in. & smaller diam.	27
⅝-in. & ⅞-in.	29
¾-in. and larger	26
Longer than 6 in.:	
All diams.	22
Lag bolts, all diams.:	
6 in. and shorter	30
over 6 in. long	28
Ribbed Necked Carriage	26
Blank	40
Plow	40
Step, Elevator, Tap, and Sleigh Shoe	28
Tire bolts	20
Boiler & Fitting-Up Bolts	37

NUTS

H.P. & C.P. Reg. & Heavy Square:	Reg.	Heavy
½-in. and smaller	25	
⅝-in. & ⅞-in.	23	
¾-in.-1 1/2-in.	23	
1⅛ in. and larger	16	
H.P. Hex.:	Reg.	Heavy
½-in. & smaller	33	29
⅝-in. & ⅞-in.	28	25
¾-in.-1½-in.	25	23
1⅛ in. & larger	17	16
C.P. Hex:		
½-in. & smaller	33	29
⅝-in. & ⅞-in.	30	27
¾-in. & 1½ in.	27	24
1⅛ in. & larger	20	17

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

½-in. and smaller	Hvy.	Reg.	Lght.
	35	41	41
⅝-in. & ⅞-in.	30	36	36
¾-in.-1½ in.	27	31	33
1⅛-in.&larger	17	21	..

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish	63.5 & 10
Plated finishes	50 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:	
¼-in. through ⅝-in.	50
¾-in. through 1 in.	43
Longer than 6 in.:	
¼-in. through ⅝-in.	33
¾-in. through 1 in.	13

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam x 6 in. and shorter	46
1 in. and smaller diam. x over 6 in.	33

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller	41
¼-in. diam. & larger	24
N.F. thread, all diams.	18

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger	7.25c
⅞-in., under	43 off

Washers, Wrought

F.o.b. shipping point, to jobbers ..... Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Inches Length	Cents per lb.
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4, 5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00

CARBON

40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	34,90	7.50
14	60,72	8.00
10,12	60	8.25

STAINLESS STEEL

(cents per pound)

Type	Sheets	C.R. Strip	Bars Wire Structurals
301	37.50	30.50	28.50
302	37.50	33.00	28.50
303	39.50	36.50	31.00
304	39.50	35.00	30.00
309	52.00	52.00	41.50
316	53.00	55.00	46.00
321	45.50	44.50	34.00
347	50.00	48.50	38.50
410	33.00	27.00	23.00
416	33.50	33.50	23.50
420	40.50	43.50	28.50
430	35.50	27.50	23.50
501	24.00	22.50	11.50
502	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2.

Baltimore, bars, wire and structurals A10.

Brackenridge,Pa., sheets A4

Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.

Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18.

Cleveland, strip, except Type 309 quoted 51.00c, and except Type 416 A7.

Detroit, strip, except Type 309 M1.

Dunkirk,N.Y., bars, wire A4.

Duquesne, Pa., bars C3.

Gary, Ind., sheets except Type 416 C3.

Harrison, N. J., strip C18.

Massillon, all products, except Type 309 bars, wire & structurals quoted 42.00c, Type 501, 10.50c, Type 502 11.50c R2.

McKeesport, Pa., bars; sheets except Type 416, C3.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip, except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars C3.

Pittsburgh, sheets C18.

Reading, Pa., bars & strip except Type 309 bars quoted 42.00c C4.

So. Chicago, Ind., bars & structurals C3.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars U4.

Wallingford, Conn., strip, except 309, W2 quotes ¼-cent higher.

Washington, Pa., bars, sheets & strip except Type 309 strip quoted 51.00c J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 58.00c, strip 60.00c W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, except Type 309 quoted 51.00c A4.

Youngstown, strip C8.

COAL, CHEMICALS

Spot, cents per gallon, ovens	
Pure benzol	22.00
Toluol, one deg.	19.00-24.75
Industrial xylol	20.50-26.50

Per ton bulk, ovens

Sulphate of ammonia	$45.00

Cents per pound, ovens

Phenol, 40 (carlots, returnable drums)	13.50
Do., less than carlots	14.25
Do., tank cars	12.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34. Imported, net ton, duty paid, metallurgical grade, $39-$40.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh)

	Cents
Sponge Iron:	
98+% Fe, carlots	15.00
Swedish, c.i.f. New York, in bags	7.40-8.50
Electrolytic Iron:	
Annealed, 99.5% Fe	39.50
Unannealed, 99+% Fe	33.50
Unannealed, 99+% Fe (minus 325 mesh)	48.50
Carbonyl Iron:	
97.9-99.8%, size 5 to 10 microns	70.00-135.00
Aluminum:	
Carlots, freight allowed	27.00
Atomized, 500-lb drums, freight allowed	30.00
Brass, 10-ton lots	23.25-26.25
Copper:	
Electrolytic	27.75
Reduced	27.00
Lead	18.50
Manganese:	
Minus 100-mesh	52.00-55.00
Minus 35 mesh	48.00
Minus 200 mesh	56.00
Nickel, unannealed	61.00-66.00
Silicon	34.00-40.00
Solder (plus cost of metal)	8.50
Stainless Steel, 302	75.00
Tin	86.50
Zinc, 10-ton lots	15.25-18.00

	Dollars
Tungsten:	
99%, minus 80 to 200 mesh, freight allowed, over 1000 lb	2.90
1000 lb	2.95
less than 1000 lb	3.00
98.8%, minus 65 mesh, freight allowed. 1000 lb and over	2.90
less than 1000 lb	3.00
Molybdenum:	
99%, minus 80 to 200 mesh, over 500 lb	2.25
200 to 500 lb	2.60
less than 200 lb	2.75
82-88%, freight allowed, 2000 lb and over	2.40
less than 2000 lb	2.45
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll,fur	$13.00-13.50
Connellsvll,fdry	15.00-16.00
New River, foundry	18.00
Wise county, foundry	15.35
Wise county, furnace	14.60

OVEN FOUNDRY COKE

Kearney, N. J., ovens	$22.00
Everett, Mass., ovens	
New England, del.	22.70
Chicago, ovens	21.00
Chicago, del.	†22.45
Detroit, del.	24.91
Terre Haute, ovens	21.20
Milwaukee, ovens	21.75
Indianapolis, ovens	19.85
Chicago, del.	23.32
Cincinnati, del.	22.17
Detroit, del.	23.75
Ironton, O., ovens	20.40
Cincinnati, del.	22.71
Painesville, O., ovens	21.90
Buffalo, del.	24.02
Cleveland, del.	23.62
Erie, del.	22.04
Birmingham, ovens	18.70
Philadelphia, ovens	20.45
Neville Island, Pa., ovens	20.00
Swedeland, Pa., ovens	20.40
Portsmouth, O., ovens	19.50
Detroit, ovens	20.65
Detroit, del.	*21.70
Buffalo, del.	22.95
Flint, del.	23.00
Pontiac, del.	21.98
Saginaw, del.	23.30

Includes representative switching charge of: *, $1.05; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.03 freight zone from works.

UNIVERSITY OF MICHIGAN LIBRARIES

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS				PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140‡	Standard Structural Shapes	Carbon	Floor
New York (city)	5.75	6.84	7.20	6.04	...	5.85	6.64	8.60	5.65	5.90	7.34
New York(c'try)	5.55	6.54	6.90	5.84	...	5.65	6.44	8.40	5.45	5.70	7.14
Boston (city) ..	5.75	6.68	7.19	5.98	...	5.80	6.50	8.70	5.75	6.08	7.28
Boston (c'try) .	5.55	6.48	6.99	5.78	...	5.60	6.30	8.50	5.55	5.88	7.08
Phila. (city) ..	6.45	6.60	6.95	5.90	...	5.75	6.46	8.40	5.50	5.70	6.80
Phila. (c'try) .	6.20	6.35	6.70	5.65	...	5.50	6.21	8.15	5.25	5.45	6.55
Balt. (city) ...	5.25	6.59	6.66	5.79	...	5.69	6.39	...	5.69	5.40	7.04
Balt. (c'try) ..	5.05	6.39	6.46	5.59	...	5.49	6.19	...	5.49	5.20	6.84
Norfolk, Va. ..	6.10	...	...	...	...	6.15	7.20	...	6.20	6.15	7.55
Wash. (w'hse).	5.46	...	...	6.00	...	5.90	6.62	...	5.90	5.61	7.25
Buffalo (del.)..	5.25	6.00	7.00	5.61	...	5.25	5.95	10.10††[5]	5.35	5.65	6.95
Buffalo (w'hse)	5.05	5.80	6.80	5.41	...	5.05	5.75	9.90††[5]	5.15	5.45	6.75
Pitts. (w'hse)..	5.05	5.80*	6.45-6.70	5.20	6.15	5.00	5.75	9.55††	5.05	5.15	6.40
Detroit (w'hse).	5.33	6.08*	7.09	5.49	...	5.39	6.03	9.86††[5]	5.44	5.59	6.68
Cleveland (del.)	5.25	6.00	7.15	5.44	6.20	5.32	5.95	8.31	5.37	5.52	6.87
Cleve. (w'hse).	5.05	5.80	6.95	5.24	6.00	5.12	5.75	8.16	5.17	5.32	6.67
Cincin. (w'hse).	5.32	5.84	6.29	5.49	...	5.39	6.10	9.90††[5]	5.44	5.59	6.75
Chicago (city) .	5.25	6.00*	6.90	5.30	...	5.20	5.85	9.75††[5]	5.25	5.40	6.60
Chicago (w'hse)	5.05	5.80*	6.70	5.10	...	5.00	5.65	9.55††[5]	5.05	5.20	6.40
Milwaukee(city)	5.39	6.14*	7.04	5.44	...	5.34	6.09	9.89††[5]	5.39	5.54	6.74
Milwau. (c'try).	5.19	5.94*	6.84	5.24	...	5.14	5.89	9.69††[5]	5.19	5.34	6.54
St. Louis (del.).	5.53	6.28	7.18	5.58	...	5.48	6.23	10.03††[5]	5.53	5.68	6.88
St. L. (w'hse).	5.38	6.13	7.03	5.43	...	5.33	6.08	9.88††[5]	5.38	5.53	6.73
Birm'ham (del.)	5.20[10]	5.95	6.30[2]	5.25[10]	...	5.15[10]	6.88	...	5.20[10]	5.35[10]	7.63[10]
Birm'hm(w'hse)	5.05[10]	5.80	6.15[2]	5.10[10]	...	5.00[10]	...	...	5.05[10]	5.20[10]	...
Omaha, Nebr. .	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	5.95	7.15	7.60	6.00	8.25	5.95	7.70	...	5.85	5.95	8.15
L. A. (w'hse).	5.80	7.00	7.45	5.85	8.10	5.80	7.55	...	5.70	5.80	8.00
San Francisco .	6.25[9]	8.60[2]	7.50[2]	6.75[9]	8.25[3]	6.15[9]	7.80[8]	...	6.00[9]	6.15[9]	8.10[9]
Seattle-Tacoma .	6.70[7]‡	8.15[3]	...	6.90	...	6.35	8.50	10.10	6.20	6.35[7]	8.40[7]
Kans. (w'hse) .	5.65	6.40	7.30	5.70	...	5.60	6.35	10.10	5.65	5.80	7.00

*Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 1000 lb and over; [1]—1500 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—300 to 499 lb; [9]—400 to 3999 lb; [10]—500 to 9999 lb inclusive.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., $107; Ottawa, Ill., $106. Hard-fired, $141 at above points, except $135, Ottawa, Ill.

High-heat Duty: Salina, Pa. $91; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $86.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $80.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., $72; Ottawa, Ill., $70.

LADLE BRICK

Dry Press: Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O., Chester, W. Va., New Cumberland, W. Va., $60.

Wire Cut: Chester, W. Va., Wellsville, O., New Cumberland, W. Va., $58.

MALLEABLE BUNG BRICK

St. Louis, Mo., Olive Hill, Ky., $96; Ottawa, Ill., $90; Beach Creek, Pa., $86.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $86; Hays, Pa., $91; Joliet or Rockdale, Ill., E. Chicago, Ind., $95; Lehi, Utah, Los Angeles, $101.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $84.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $85.

BASIC BRICK

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅜" grains; bulk, $30.50-$31; single paper bags, $35-$35.50.

DOLOMITE

(Base prices per net ton)

Domestic dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. After Jan. 25, 1950, increases or decreases, if any, in upper lake rail freight, dock handling charges and taxes threon are for buyer's account.

Old range bessemer	$8.10
Old range nonbessemer	7.95
Mesabi bessemer	7.85
Mesabi nonbessemer	7.70
High phosphorus	7.70

EASTERN LOCAL ORE

Cents per unit, del E. Pa.

Foundry and basic 56.62% concentrates contract	16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hemitites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty paid	$20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 79.8c-81.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore. Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48%	2.8:1	$32.50
48%	3:1	35.00-36.00
48%	no ratio	26.00

South African Transvaal

44%	no ratio	$17.00-18.00
45%	no ratio	18.00-18.50
48%	no ratio	26.00-27.00
50%	no ratio	27.00-27.50

Brazilian

44%	2.5:1 lump	$32.00

Rhodesian

45%	no ratio	$20.00-21.00
48%	no ratio	28.00-29.00
48%	3:1 lump	36.00-37.00

Domestic—rail nearest seller

48%	3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, cl., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 29c per lb of metal; packed, 35.5c; ton lot 31.25c, less ton lot 33.25c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

(Please turn to page 159)

Coal Crisis Deters Metal Buying

Consumers hesitate in making future commitments in view of rapid deceleration in industrial activity. Straits tin eases 74.12½c; antimony, 2.75c to 24.50c

New York—Shortage of coal continues the dominant factor in nonferrous metal markets. Metalworking industries are extremely cautious in making forward commitments due to their fear that at least part of the tonnages on order for March delivery will not be consumed in that period. If their operations are curtailed by fuel and power shortages and if movement of freight is hampered further, metals scheduled to be delivered this month will not be needed until April or later. Although bookings of copper, lead and zinc are lighter, prices are firm at current levels. Tin continues to fluctuate, Straits being offered down to 74.12½c for March through May delivery.

Antimony—National Lead Co. reduced the price of antimony 2.75 cents a pound to 24.50c for bulk quantities at Laredo, Tex., effective Mar. 2. The decline reflects a continued lack of consumer demand and offerings of foreign-origin antimony at prices that had been substantially below the domestic quotation. The former price of 27.25c had prevailed since Feb. 2 when it was lowered 1.50 cents a pound.

Copper—Makers of copper products have booked good sized tonnages for March delivery and were active at the opening of producers' books for April delivery. There exists an additional carryover of nearly 20,000 tons of copper bought in previous months that has not yet been shipped to consuming plants. At the end of January, the carryover was only 6819 tons. Some industry members express concern over the February increase of nearly 13,000 tons in undelivered copper.

Some of this gain results from the inability of copper refineries to get all the metal out which was caused by furnace difficulty at one of the refineries resulting in a loss of output of casting metal in special sizes for consumers. Deliveries to industrial consumers were hampered also by work involved at the refineries in preparation of copper for delivery to the United States government for stockpiling purposes.

Copper Statistics—Position of copper consumers has improved steadily since the end of 1948 when they had a deficit of over 151,000 tons of metal. By the end of January, this deficit had been reduced to only 8692 tons. Unfilled orders on Jan. 31 amounted to 175,926 tons compared with 189,407 tons at the end of December, while their stocks and purchases of copper to cover this order backlog amounted to 167,234 tons compared with 152,487 on Dec. 31. The balancing of supplies with business booked has been achieved at the expense of producers' refined stocks which have been reduced by more than 116,000 tons in the last five months. Fabricators' total stocks of refined copper at the end of January amounted to 354,487 tons compared with 354,992 tons at the end of January and 364,656 tons at the end of the like month a year ago.

Consumption increased sharply in January to 108,921 tons from 83,437 tons in December and compared with 109,551 tons in January, 1949. Deliveries of copper to fabricators totaled 111,668 tons compared with 107,662 tons in December and 94,070 tons in January, 1949.

Based on sales reported by producers for delivery in February, coupled with carryover from the preceding month, shipments to fabricators in the month just ended again exceeded 100,000 tons.

Lead—Activity in the lead market declined noticeably last week, as a result of uncertainty over extent of curtailment that the fuel and power shortages will force upon cable, battery and other large lead-consuming plants.

Zinc — Despite the increasingly chaotic aspects of the coal situation, fairly large orders were placed for zinc by galvanizers and brass mills last week. Demand tapered, however, as the week progressed. Undertone of the market held steady at 8.75c, East St. Louis, for prime western.

Tin—With production of tin increasing steadily, while consumption in this country has declined to the lowest level since 1938, it is not surprising that undertone of the market is weak. Agitation for production curbs are increasing. Straits spot is offered down to 74.12½ for prompt through May delivery.

World mine production of tin increased slghtly in December to 14,500 tons from 14,200 tons in November, reports the International Tin Study Group. The increase is attributed entirely to Bolivia, whose December exports were 4210 tons compared with 3643 tons in November.

On the basis of the December production rate, United States government's stockpiling purchases in 1950 may be equivalent to about three months' output. While no official announcement has been made, it is estimated that stockpiling purchases this year may total 45,000 tons. Of this, 25,000 tons would be Malayan, 15,000 tons Dutch, and 5000 Belgian tin. These purchases plus Indonesian concentrates for the Texas City, Tex., smelter may leave only about 5000 to 6000 tons of Dutch tin for commercial disposal this year.

World tin plate output amounted to 386,000 tons in December against 338,000 tons in November.

STEEL's Metal Price Averages for Feb., 1950

(Cents per pound)

Electrolytic Copper, del. Conn.	18.500
Lead, St. Louis	11.800
Prime, Western Zinc, E. St. Louis	9.810
Straits Tin, New York	74.352
Primary Aluminum Ingots, del.	17.000
Antimony, f.o.b. Laredo, Tex.	27.318
Nickel, f.o.b. refinery	40.000
Silver, New York	73.250

1949 Lead Output Rises 3%

Washington—Domestic mine output of recoverable lead rose 3 per cent in 1949 compared with 1948 and was the largest since 1944, Bureau of Mines reports. This gain reflected the incentive of high market prices during the early part of the year and also fewer interruptions in operation due to labor-management disputes such as the labor strike which shut down the large lead mines in Southeastern Missouri for 2½ months in 1948 at an estimated loss of 25,000 tons of lead. A downward trend in lead price which began in March and continued through May resulted in some mine closings and reduced work weeks at most large lead-producing properties, but failed to offset completely the net gain in output recorded during the early part of 1949.

Except for January, production during the first half of the year was at a rate consistently in excess of the 1107-ton average daily output for the entire year. Production during the latter half of the year, however, fell off sharply and the daily output remained below the annual average. The daily production rate in December was 14 per cent above the low point of the year, reached in October, but was only 85 per cent of the March rate, the year's highest.

Production in 8 of the 18 lead-producing states in 1949 exceeded the rates established in 1948 and in some instances record and near-record high outputs were recorded.

Brass Ingot Shipments Rise

Chicago—Shipments of brass ingots by producers accounting for more than 95 per cent of the deliveries of the entire industry increased to 18,874 tons in January from 17,960 tons in December, reports Ingot Brass & Bronze Industry. This compares with 19,456 tons in January, 1949, and an average monthly total of 14,636 tons in 1949 and 23,292 tons in 1948.

The record of monthly shipments is:

	1947	1948	1949	1950
Jan.	27,841	26,998	19,456	18,874
Feb.	24,686	22,487	15,026	.....
Mar.	27,477	24,282	14,550	.....
Apr.	24,577	25,177	10,695	.....
May	19,525	23,716	11,114	.....
June	16,929	24,401	9,696	.....
July	16,728	20,456	10,220	.....
Aug.	18,589	24,098	14,194	.....
Sept.	19,025	23,641	16,208	.....
Oct.	22,806	21,559	18,036	.....
Nov.	21,666	21,731	18,488	.....
Dec.	23,862	20,954	17,960	.....
Total	263,711	279,500	175,643	.....

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NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 18.50c, Conn. Valley, Lake, 18.62½c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 16.75-18.25c; 88-10-2 No. 215) 25.25c; 80-10-10 (No. 305) 21.75c; No. 1 yellow (No. 405) 14.25-16.00c.

Zinc: Prime western 9.75c, brass special 10.00c, intermediate 10.25c, East St. Louis; high grade 10.85c, delivered.

Lead: Common, 11.80c; chemical, 11.90c; corroding, 11.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.50-16.75c; No. 12 foundry alloy (No. 2 grade) 16.00-16.25c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 17.75-18.00c; grade 2, 17.25-17.50c; grade 3, 15.75-16.00c; grade 4, 15.25-15.50c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt del., 74.12½c; March del. 74.12½c; April del. 74.12½c; May del. 74.12½c. Chinese 99% tin, prompt del., nominal.

RFC selling prices for prompt delivery, ex-dock New York or f.o.b. Texas City, Tex.: Grade A, 99.8% or higher (including Straits) 74.50c.

Antimony: American 99-99.8% and over but not meeting specifications below 24.50c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 25.00c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99%: Chinese, 24.00c; English, Belgium, prompt, 25.00c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $71-$74 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 73.25c per oz.

Platinum: $66-$69 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 18.50-cent copper.)

Sheet: Copper 32.18; yellow brass 28.69; commercial bronze, 95%, 32.10; 90%, 31.61; red brass, 85%, 30.60; 80%, 30.12; best quality, 29.58; nickel silver, 18%, 42.27; phosphor-bronze, grade A, 5% 50.90.

Rods: Copper, hot-rolled 28.03; cold-drawn 29.28; yellow brass free cutting, 23.19; commercial bronze, 95% 31.79; 90% 31.30; red brass 85% 30.29; 80% 29.81.

Seamless Tubing: Copper 32.22; yellow brass 31.70; commercial bronze 90% 34.27; red brass 85% 33.51; 80% 33.03.

Wire: Yellow brass 28.98; commercial bronze, 95% 32.39; 90% 31.90; red brass, 85% 30.89; 80% 30.41; best quality brass 29.87.

Copper Wire: Bare soft, f.o.b., eastern mills, 100,000 lb lots 22.55, l.c.l. 23.17, c.l. 22.67; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.85, l.c.l. 25.60, c.l. 25.10; magnet, delivered, c.l. 28.50, 15,000 lb or more 28.75, l.c.l. 29.25.

ALUMINUM

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-24	36.8	33.4	39.5
0.008-0.0075	12-24	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	—Hexagonal— R317-T4	—Hexagonal— 17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	36.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $17.00 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $17.00 per cwt. Traps and bends: List price plus 45%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled, 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 28.84c; oval 28.34c; cast 26.87c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 46.50c f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.75c; over 250 lb, 24.75c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 100 lb, 64.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl. 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over 91.00c; 500 to 999 lb, 91.5c; 200 to 499 lb, 92.00c; less than 200 lb, 93.5c; ball, 1000 lb and over, 93.25c; 500 to 999 lb, 93.75c; 200 to 499 lb 94.25c; less than 200 lb, 95.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 58.2c; 100 or 300 lb drums only, 100 to 500 lb, 49.9c; 600 to 1900 lb, 47.6c; 2000 to 9900 lb, 45.8c, f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 84.50c; more than 2000 lb, 82.50c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 70.80c; 100 lb kegs 71.80c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	15.50	15.50	14.75
Yellow brass	12.50	12.25	11.37½
Commercial Bronze			
95%	14.50	14.25	13.75
90%	14.25	14.00	13.50
Red brass			
85%	14.00	13.75	13.25
80%	13.62½	13.37½	12.87½
Best Quality (71-80%)	13.37½	13.12½	12.62½
Muntz Metal	11.50	11.25	10.75
Nickel, silver, 10%	14.50	14.25	7.25
Phos. bronze, A	16.75	16.50	15.50
Naval brass	12.00	11.75	11.25
Manganese bronze	12.00	11.75	11.12½

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; composition red brass 12.50; radiators 10.00; heavy yellow brass 9.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; refinery brass (60% copper) per dry copper content 13.50-13.75.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 13.50-13.75; No. 2 12.50-12.75; light copper 11.50-11.75; No. 1 composition red brass 11.00-11.25; No. 1 composition turnings 10.25-10.50; mixed brass turnings 6.25-6.50; new brass clippings 10.50-11.00; No. 1 brass rod turnings 9.25-9.50; light brass 6.00-6.25; heavy yellow brass 7.25-7.50; new brass rod ends 9.75-10.00; auto radiators, unsweated 8.50-8.75; cocks and faucets, 8.50-8.75; brass pipe 9.00-9.25.

Lead: Heavy 9.25-9.50; battery plates 4.25-4.50; linotype and stereotype 10.00-10.25; electrotype 9.00-9.25; mixed babbitt 9.25-9.50.

Zinc: Old zinc 4.25-4.75; new die cast scrap 4.00-4.50; old die cast scrap 3.00-3.25.

Tin: No. 1 pewter 39.00-41.00; block tin pipe 60.00-62.00; No. 1 babbitt 30.00-32.00.

Aluminum: Clippings 2S 10.50-11.00; old sheets 7.50-8.00; crankcase 7.50-8.00; borings and turnings 3.00-3.50.

DAILY PRICE RECORD

1949	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Mar. 2	18.50	11.80	9.75	74.125	17.00	24.50	40.00	73.25
Mar. 1	18.50	11.80	9.75	74.125	17.00	27.25	40.00	73.25
Feb. Avg.	18.50	11.80	9.75	74.352	17.00	27.318	40.00	73.25
Feb. 23-28	18.50	11.80	9.75	74.125	17.00	27.25	40.00	73.25
Feb. 21	18.50	11.80	9.75	74.25	17.00	27.25	40.00	73.25
Feb. 20	18.50	11.80	9.75	74.37½	17.00	27.25	40.00	73.25
Feb. 14-18	18.50	11.80	9.75	74.50	17.00	27.25	40.00	73.25
Feb. 10-11	18.50	11.80	9.75	74.375	17.00	27.25	40.00	73.25
Feb. 7-9	18.50	11.80	9.75	74.50	17.00	27.25	40.00	73.25
Feb. 2-6	18.50	11.80	9.75	74.375	17.00	27.25	40.00	73.25
Feb. 1	18.50	11.80	9.75	74.25	17.00	28.75	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Mar. 2, 1950; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Mar. 2	$27.33
Feb. 23	27.67
Feb. 1950	27.52
Mar. 1949	34.60
Mar. 1945	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	*$31.00*
No. 2 Heavy Melt.	*28.00**
No. 1 Busheling	*31.00**
No. 1 Bundles	*31.00*
No. 2 Bundles	24.00-25.00*
No. 3 Bundles	23.00-24.00*
Heavy Turnings	26.00-27.00
Machine Shop Turnings	21.50-22.00†
Mixed Borings, Turnings	21.50-22.00†
Short Shovel Turnings	25.00
Cast Iron Borings	24.00-25.00
Low Phos. Steel	32.00-33.00*

Cast Iron Grades*

No. 1 Cupola Cast	34.00-35.00
No. 1 Machinery Cast	38.00-39.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast	29.00-30.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50-33.00
Axles	35.00-36.00
Rails, Random Lengths	35.50-36.00
Rails, 2 ft. and under	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	34.00-35.00
Angles, Splice Bars	32.00-33.50*

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	$28.00-28.50
No. 2 Heavy Melt. Steel	25.50-26.00
No. 1 Busheling	28.00-28.50
No. 1 Bundles	28.00-28.50
No. 2 Bundles	22.00-22.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	21.00-21.50
Short Shovel Turnings	21.00-21.50
Cast Iron Borings	21.00-21.50
Low Phos.	29.00-29.50
Cut Structurals	31.00-31.50

Cast Iron Grades

No. 1 Cupola	41.50-42.00
Charging Box Cast	38.00-39.00
Stove Plate	35.50-36.50
Heavy Breakable Cast	31.00-31.50
Unstripped Motor Blocks	31.00-32.00
Brake Shoes	28.50-29.50
Clean Auto Cast	42.00-43.00
No. 1 Wheels	36.50-37.00
Burnt Cast	31.50-32.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50-33.00
R.R. Malleable	38.50-39.00
Rails, 3 ft and under	41.00-42.00
Rails, 18 in. and under	43.00-44.00
Rails, Random Lengths	38.00-39.00
Cast Steel	34.00-35.00
Railroad Specialties	35.00-35.50
Uncut Tires	36.00-37.00
Angles, Splice Bars	39.50-40.50

VALLEY

No. 1 Heavy Melt. Steel	$31.50-32.00
No. 2 Heavy Melt. Steel	29.00-30.00
No. 1 Bundles	31.50-32.00
No. 2 Bundles	24.50-25.50
Machine Shop Turnings	21.50-22.50
Short Shovel Turnings	23.50-24.00
Cast Iron Borings	23.50-24.00
Low Phos.	32.50-33.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.00-33.50

PHILADELPHIA

No. 1 Heavy Melt. Steel	$23.50
No. 2 Heavy Melt. Steel	21.50
No. 1 Busheling	21.50
No. 1 Bundles	23.50
No. 2 Bundles	18.00-18.50
Machine Shop Turnings	15.50
Short Shovel Turnings	*18.00*
Mixed Borings, Turnings	15.00-15.50
Low Phos. Punchings and Plate, elec. fur. grade	26.50-27.50
Cut Structurals	*25.50-26.00*
Elec. Furnace Bundles	24.50
Heavy Turnings	23.50
No. 1 Chemical Borings	29.00
Knuckles and Couplers	*28.00*
Steel car wheels	*28.00*

Cast Iron Grades

No. 1 Cupola Cast	*30.00-31.00*
No. 1 Machinery Cast	36.00-37.00
Charging Box Cast	*32.00-34.00*
Heavy Breakable Cast	*32.00-34.00*
Unstripped Motor Blocks	25.00
Clean Auto Cast	36.00-37.00
No. 1 Wheels	37.00
Malleable	38.00

CINCINNATI

No. 1 Heavy Melt. Steel	*$27.00*
No. 2 Heavy Melt. Steel	23.00
No. 1 Busheling	*27.00*
No. 1 Bundles	*27.00*
No. 2 Black Bundles	*23.00*
No. 3 Bundles	*18.00*
Machine Shop Turnings	*14.00*
Short Shovel Turnings	*17.00*
Mixed Borings, Turnings	16.00
Cast Iron Borings	*17.00*

Cast Iron Grades

No. 1 Cupola Cast	38.00
Charging Box Cast	*36.00*
Stove Plate	*28.00*
Heavy Breakable Cast	32.00
Unstripped Motor Blocks	22.00
Brake Shoes	22.00
Clean Auto Cast	38.00
Drop Broken Cast	42.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.00
R.R. Malleable	33.00
Rails, Rerolling	34.00
Rails, Random Lengths	33.00
Rails, 18 in. and under	42.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$21.00-22.00
No. 1 Bundles	23.00-24.00
No. 2 Bundles	20.00-21.00
No. 1 Busheling	23.00-24.00
Machine Shop Turnings	12.00-13.00
Mixed Borings, Turnings	12.00-13.00
Short Shovel Turnings	14.00-15.00
Cast Iron Borings	16.00-17.00
Punchings & Plate Scrap	23.00-24.00

Cast Iron Grades

No. 1 Cupola Cast	33.00-34.00
Heavy Breakable Cast	29.00-30.00
Clean Auto Cast	35.00-36.00

BUFFALO

No. 1 Heavy Melt. Steel	$28.00-28.50
No. 2 Heavy Melt. Steel	25.50-26.00
No. 1 Bushelings	25.50-26.00
No. 1 Bundles	26.50-27.00
No. 2 Bundles	24.00-24.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Short Shovelings	19.50-20.00
Low Phos.	29.00-29.50

Cast Iron Grades

No. 1 Machinery	35.00-36.00
No. 1 Cupola	30.50-31.50
Stove Plate	29.50-30.50
Malleable	31.00-32.00

Railroad Scrap

Rails, 2 ft. and under	38.00-39.00
Scrap rails	35.00-35.50
Specialties	33.00-34.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$20.50-21.00
No. 2 Heavy Melt. Steel	17.50-18.00
No. 1 Busheling	17.50-18.00
No. 1 Bundles	20.25-20.75
No. 2 Bundles	16.00
Machine Shop Turnings	10.50-11.00
Mixed Borings, Turnings	10.50-11.00
Short Shovel Turnings	10.50-11.00
Punchings & Plate Scrap	19.50-20.00
Cut Structurals	19.50-20.00
Elec. Furnace Bundles	19.50-20.00

Cast Iron Grades

No. 1 Cupola Cast	25.00-25.50
No. 1 Machinery	26.00-27.00
Charging Box Cast	*25.50-26.00*
Heavy Breakable	*25.50-26.00*
Unstripped Motor Blocks	20.00-21.00
Malleable	34.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	*$20.00-20.50*
No. 2 Heavy Melt. Steel	*16.00-17.00*
No. 1 Bundles	19.00-20.00
No. 1 Busheling	*18.00-18.50*
Machine Shop Turnings	*11.00-11.50*
Mixed Borings, Turnings	*10.50-11.00*
Short Shovel Turnings	13.00-13.50
Bar Crops and Plate	21.00-22.00
Punchings & Plate Scrap	21.00-22.00
Chemical Borings	19.00-19.50

Cast Iron Grades

No. 1 Cupola Cast	27.50-30.50
Mixed Cast	21.00-22.00
Heavy Breakable Cast	24.50-25.50
Stove Plate	21.50-22.50
Unstripped Motor Blocks	17.50-18.50

CHICAGO

No. 1 Heavy Melt. Steel	$27.00-28.00
No. 2 Heavy Melt. Steel	25.50-26.50
No. 1 Bundles	27.00-28.00
No. 2 Bundles	24.00
Machine Shop Turnings	19.00-20.00
Mixed Borings, Turnings	19.00-20.00
Short Shovel Turnings	20.00-21.00
Cast Iron Borings	19.00-20.00
Low Phos.	30.50-31.50
Elec. Furnace Bundles	27.00-28.00
Heavy Turnings	23.00-24.00
Cut Structurals	29.00-30.00

Cast Iron Grades

No. 1 Cupola Cast	40.50-41.50
Clean Auto Cast	41.50-42.50
No. 1 Wheels	33.00-34.00
Stove Plate	31.50-32.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	29.00-30.00
Malleable	35.00-36.00
Rails, Rerolling	40.00-41.00
Rails, Random Lengths	33.00-34.00
Rails, 2 ft and under	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	30.00-31.00
Angles, Splice Bars	34.00-35.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	*$24.00*
No. 2 Heavy Melt. Steel	22.00
No. 1 Busheling	*22.00*
No. 2 Bundles	20.00
Machine Shop Turnings	22.50
Mixed Borings, Turnings	17.00
Short Shovel Turnings	23.00
Cast Iron Borings	19.00
Bar Crops and Plate	27.00-28.00
Cut Structurals	27.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00
Stove Plate	30.00
No. 1 Wheels	nominal

Railroad Scrap

No. 1 R.R. Heavy Melt.	25.00-26.00
R.R. Malleable	nominal
Rails, Rerolling	33.00-35.00
Rails, 3 ft and under	nominal
Angles and Splice Bars	nominal

ST. LOUIS

No. 1 Heavy Melt. Steel	$28.00-29.00
No. 2 Heavy Melt. Steel	24.00-25.00
Machine Shop Turnings	14.00-15.00
Short Shovel Turnings	18.00-19.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00
Charging Box Cast	29.00-30.00
Heavy Breakable Cast	28.00-29.00
Brake Shoes	27.00-28.00
Clean Auto Cast	36.00-38.00
Burnt Cast	27.00-28.00

Railroad Scrap

R.R. Malleable	31.00-33.00
Rails, Rerolling	36.00-37.00
Rails, Random Lengths	30.00-31.00
Rails, 3 ft. and under	35.00-36.00
Uncut Tires	27.00-28.00
Angles, Splice Bars	32.00-33.00
Railroad Specialties	30.00-31.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos 1 & 2 Bundles	16.00
No. 3 Bundles	13.00
Machine Shop Turnings	9.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-32.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Random Lengths	20.00

SEATTLE

No. 1 Heavy Melt. Steel	$18.00
No. 2 Heavy Melt. Steel	18.00
No. 1 Busheling	15.50
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	13.00
Mixed Borings, Turnings	13.00
Punchings & Plate Scrap	27.50
Cut Structurals	27.50

Cast Iron Grades

No. 1 Cupola Cast	25.00-27.50
Heavy Breakable Cast	25.00
Stove Plate	25.00
Unstripped Motor Blocks	18.00
Malleable	25.00
Brake Shoes	20.00
Clean Auto Cast	27.50
No. 1 Wheels	27.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	19.00
Railroad Malleable	25.00
Rails, Random Lengths	19.00
Angles and Splice Bars	19.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	9.00
Mixed Borings, Turnings	9.00
Punchings & Plate Scrap	26.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-33.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Rerolling	32.00

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$24.00
No. 1 Bundles	24.00
Mechanical Bundles	22.00
Mixed Steel Scrap	20.00
Mixed Borings, Turnings	18.00
Rails, Remelting	24.00
Rails, Rerolling	27.00
Busheling	18.00
Bushelings new factory, prep'd	22.00
Bushelings new factory, unprep'd	17.00
Short Steel Turnings	18.00

Cast Iron Grades

Cast	40.00-43.00*

* F.o.b. shipping point.

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Sheets Strip . . .

Sheet and Strip Prices, Page 143 & 144

Chicago — Sheet consumers are digging into their limited inventories as finishing operations are curtailed, due to lack of power and semifinished steel. A byproduct of the situation is expected to be greater reliance on substitute materials. A number of makers of heating ductwork will switch to use of aluminum. Galvanizing operations are badly crippled at some mills. Stainless production also is widely curtailed by power use restrictions. Two automakers—anticipating closing for lack of steel and coal—have notified suppliers when to shut off shipments.

Pittsburgh — Steady advance in sheet bar prices since last fall has forced nonintegrated hand mill operators to increase their selling prices on hot-rolled sheets to within a range of $6 to $6.75 per 100 lb. Galvanized sheets also are selling at premium prices.

Allegheny Ludlum, Wheeling Steel and Niles Rolling Mill have followed other producers in reducing armature and electrical silicon steels $5 per ton.

Output of sheet and strip was curtailed sharply last week reflecting cessation of operations at Jones & Laughlin Steel Corp. and curtailed operating schedules among other interests.

Major nonintegrated cold-rolled strip producers have followed revisions in extras initially adopted by American Steel & Wire Co. Feb. 24.

Boston—Nonintegrated cold-rolled strip producers, following upward revisions on extras, hold increases are too moderate compared with existing card for hot-rolled, but higher charge for No. 4 edge meets with approval. Yet, to avoid extras on flat-rolled, more consumers are specifying mill edge. Most strip producers are scheduled through second quarter on low carbon and well into that period on high carbon.

Philadelphia—Sheet stringency is becoming increasingly pronounced as a result of the coal crisis. Indicative of this is a recent proposal to a local district mill to supply 10,000 tons of ingots for conversion into sheets. This is the first conversion offer reported in this district in a number of months. The proposal was rejected.

Cleveland—Sheet and strip shipments are slowing down with production increasingly hampered by effects of the coal strike. Curtailment of blast furnace and openhearth operation is resulting in shortages of semifinished steel which in turn are disrupting rolling mill schedules. Sheetmakers are falling behind on delivery promises. Already tight supply conditions are getting worse. Heavy carryover of first quarter tonnage into second quarter threatens unless the coal strike is quickly ended.

Cincinnati—Sheet rolling continues near capacity here, but one mill has cut steelmaking to conserve coal. Others are getting near the bottom of reserve piles. Sheet supplies, not yet caught up with demand, may become even tighter. Pressure for tonnage is broad and insistent.

St. Louis—Demand for sheets has skyrocketed as outside consumers seek to replace supplies cut off elsewhere by coal and pig iron scarcities. These cannot be filled, since rolling schedules are allotted through second quarter. Local production has not been affected yet by the coal strike.

Birmingham—Sheet demand is at an all-time high. Buying was exceptional even before the pinch in coal, and since than has gradually increased.

San Francisco—No direct reprecussions from the coal strike have been felt here, and buyers have not boosted demands for flat-rolled products. Galvanized supplies have increased.

Plates . . .

Plate Prices, Page 143

Philadelphia—Plate mills in the East have not been affected by the coal strike. Two claim that if there were to be a settlement of coal controversy within another week to 10 days, they could continue operating at the current rate without disruption. Certain other mills more remotely located in relation to the local territory have been forced to curtail and are planning further curtailment this week regardless of developments in the coal dispute.

Reduced operations at these mills have not put much additional pressure on local producers. Shortage of sheets has resulted in a slightly increased demand for light gage plates.

Boston—Plate buying lags and fabricating shops show little disposition to build inventories in view of prompt deliveries from eastern Pennsylvania within three weeks and under. Shipments from Pittsburgh are slightly more extended, but volume with units in that area is limited due to higher freight charges to New England consuming points. Large diameter steel pipe features demand with the Holyoke, Mass. fabricating shop.

Cleveland—Threat of curtailed production has not materially stimulated demand for plates. The mills have been giving relatively prompt delivery right along, but with operations beginning to be hampered by effects of the coal strike some backing up in shipments may be experienced. Demand, in general, has been only fair since the end of the steel strike. Producers are not under pressure. Boiler makers are specifying steadily. Eastern mills are pushing for business in this area and in a few instances, they have absorbed some freight on shipments where competitive conditions required such concessions.

Birmingham — Plate requirements, already backed up in this district for several months, assume alarming proportions as the Fairfield mill succumbs to the coal strike. Most serious impact, will be on the Bessemer plant of Pullman-Standard Car Mfg. Co. which was just getting ready for a comparatively large car building program. An indefinite delay in that program is indicated.

Milwaukee — Rejections of plates have mounted despite a growing shortage. Consumers' metallurgists say that poor quality of coking coal is showing up in the finished material. Eastern producers are offering material here, in some cases for quick delivery, although purchasing men expect steel output reductions will shut off these offerings in the near future.

Los Angeles — Plate supplies are tightening with reduction of operations at Kaiser's Fontana mill and suspension at Geneva works. Mills have been quoting 60-90 day delivery. Demand remains light and steady.

Wire . . .

Wire Prices, Page 145

Boston—On low-carbon wire and an increased number of specialties, wire mills are more extended into second quarter. Buying is well maintained. Music wire is more active and miscellaneous requirements for mechanical springs are substantial.

By state allocation, 1000 tons of coal are assigned New England plants of Wickwire Spencer Division, Colorado Fuel & Iron Corp., enough for 20 day's operation. More finished wire is being shipped by truck; railroads are meeting the competition by revising rates. New Haven Railroad proposes to reduce the rate from Worcester to Waterbury and Waterville, Conn., on steel wire from 36 cents per 100 lb. to 23 cents.

Cleveland—Wire sellers report continued strong demand with bookings extending well ahead. Farm and building requirements are expected to spurt with the coming of spring. Local wire mill operations of the American Steel & Wire Co., up to late last week, had been only slightly affected by the coal strike. The company, however, banked the two blast furnaces it operates here. It has no steelmaking furnaces at this point.

Birmingham — Log jam in wire products will develop in the territory almost overnight, following the shutdown of the Fairfield mill. Spot demand tapered slightly during the last two weeks because of cold weather, but will pick up soon because the spring demand is about ready to set in.

Tubular Goods . . .

Tubular Goods Prices, Page 146

Pittsburgh—Output of pipe and tubing is substantially reduced due to complete cessation of operations at Jones & Laughlin Steel Corp. and reductions ranging up to 50 per cent among other producers here. Interruption to production schedules is not expected to have an immediate adverse effect on consumers' operations. Jobbers' stocks of standard pipe and tubing, although below normal, are ample to meet present emergency. Construction of gas conveying lines should not be interrupted.

Summerill Tubing Division, Columbia Steel & Shafting Co., Pittsburgh, has been awarded contract for seamless steel tubing, $102,051, by the Navy Department.

Alliance, O. — Babcock & Wilcox Tube Co. has issued new price sheets on electric-resistance welded carbon steel boiler tubes.

San Francisco—Supplies of galvanized and some other types of plumbing pipe are scarce; stocks of most other tubular items are adequate.

Seattle—Turnover of cast iron pipe

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continues below normal. The large municipal buyers are still drawing on inventories purchased during the shortage two years ago, deliveries still being made. They will not be in the market for some time.

Tin Plate . . .

Tin Plate Prices, Page 144

Pittsburgh—Tin plate production schedules are fairly well sustained at plants of Weirton Steel Co., Wheeling Steel Corp. and Carnegie-Illinois Steel Corp.; they have been suspended at Jones & Laughlin Steel Corp. Nearly all producers are expected to curtail production sharply soon, despite the fact tin plate normally is the last of finished steel items to be influenced by sharp curtailments in primary steel output.

Steel Bars . . .

Bar Prices, Page 143

New York—Hot carbon bar production has undergone further curtailment because of the coal strike, although some plants still are operating on a normal basis. Most sellers are quoting little tonnage under six weeks and in some cases as far ahead as eight and nine weeks, depending upon what happens in coal.

Boston—For cold finishing, demand for hot-rolled carbon bars is slightly stronger; high sulphur bessemer buying is more active with some mills scheduled into June with other carbon grades in May. Manufacturers of firearms are buying more steel.

Pittsburgh—No hot bar mills were operating here by the close of last week. Curtailment in electric power supply forced reduction of nearly 50 per cent in production schedules among cold finishers. These interests contend hot-rolled bar stocks should sustain 50 per cent operations for three weeks. Customers' steel inventory position is spotty with important consumers, such as auto parts makers, reporting very low stocks.

Lockhart Iron & Steel Co. has advanced extras for wrought iron bars. Sharpest increase is in size extras which had not been altered for years. New size extras closely compare with those now in effect for hot-rolled merchant carbon steel bars.

Philadelphia—Some hot carbon bar mills which normally compete in this market have been forced to suspend operations because of the coal situation. Fortunately most consumers and distributors are fairly well covered for the present. Some consumers could continue normal operations for another two or three weeks on their bar supplies, if not longer, especially considering receipt of such shipments as are now enroute.

Cleveland—Merchant bars are moving steadily into consumption, but shipments are tending to taper with production hampered by the coal strike. Of late, there has been a little more active specifying. This is due, in part, to consumers' efforts to augment inventories against possible tightening in supply. Nothing approaching the rush experienced prior to last fall's steel strike is in evidence, however. Bar supply conditions vary according to sizes. They are not comparable with the situation in light, flat-rolled items though some consumers have not yet been able to restore pre-steel strike inventory balance. Hot-rolled carbon bars are available for shipment in 45 days; cold-finished bars in somewhat shorter time. Alloy bars are more readily obtainable.

Chicago—Already in arrears on deliveries, some steel companies expect quotas will be cut because of the present loss of tonnage. Several mills are fuly booked into early summer on all classes of bars and will have to move delivery promises back in line with the production time now being lost.

Seattle—Rolling mills are on reduced schedules, but pending business forecasts increased activity shortly. Demand for small tonnages of reinforcing bars is insistent.

Tool Steel . . .

Tool Steel Prices, Page 145

Pittsburgh—Tool steel output has been affected adversely by a cut of 50 per cent in supply of power for operation of electric furnaces plus frequent reductions up to 60 per cent in industrial gas supply for relatively short intervals. Inventories of tool steels in hands of consumers and in warehouses should be sufficient to meet essential needs for the present.

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Structural Shapes . . .

Structural Shape Prices, Page 145

Boston — Fabricated structural steel prices are under severe pressure; competition is sharp with at least two district shops estimating bridge work, a departure from former policy. In placing steel, some contractors are making separate arrangements for erection. Bridge requirements largely support demand with more school buildings up for estimates. Wide flanged beam backlogs extend into June with some mills, but standard structurals are available in three to four weeks. Mild upturn in freight car building is drawing off some structural material. Two Boston contractors bought 1475 tons for projects at Chicago and Savannah, Ga.

New York—Structural inquiry continues to expand, some fabricating offices predicting a sharp increase in bookings in second quarter. There is a steady increase in miscellaneous bridge work, school projects and institutional building. Indicative of substantially heavy work to come in connection with the New Jersey Turnpike are inquiries for foundations and other types of substructure work.

Philadelphia — Structural demand for public work continues to spurt. Several sizable bridge projects are up for bids this month. Usually there is more private structural demand than public, but at present the situation is reversed tonnage-wise and apparently also from the standpoint of number of projects. Structural shops have not been seriously affected by delay in delivery of shapes because of the coal crisis, but with some leading shape mills now operating at less than 50 per cent the situation with fabricators may become worse before it gets better.

Chicago — Lack of wide flange beams, for which demand is heavy, is preventing some interests from completing jobs. Farm implement production is scheduled to get some strong boosts, barring serious effects of the coal strike on general steel supply. One important tractor maker has reached all production goals, except on one model. On some models, schedules call for greater output than realized last year. Other major makers are planning output boosts to exceed last year's totals. A power shovel maker is scheduling output for the first seven months at a record level. Less subcontracting work is available here. Decision of Caterpillar Tractor Co. to cut down the amount of outside work when its new Joliet plant is built may deprive one major shop of an important sideline.

Cleveland—Fabricators are competing keenly on all new jobs appearing, and some severe price cutting on fabricated work is reported. Expectations are resumption of active building in the spring will clear up this situation to some extent. Outlook is promising for substantial volume over coming months with a considerable number of schools and several hospital projects throughout the state expected out soon for bids.

Milwaukee—Fabricators' stocks are not entirely in balance, although most have recovered from the inroads made by the steel strike. Present outlook is that stocks will again be depleted. Business is spotty, one important interest being asked to bid on more jobs than it can handle; several other shops are eager to take on additional work. A 40-hour week for one fabricator was necessary after the steel strike, but last month a 48-hour week was again possible. Subcontracting has reached a low point, although a little fill-in work of this nature is being received.

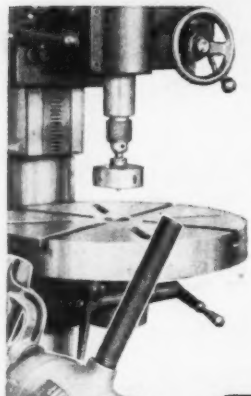
Los Angeles — Demand for structurals, paced by wide-flanged items, continues to increase. Typical of building activity sustaining demand is $70 million of junior college construction started here. Units of a $32 million Los Angeles county construction program are either underway or scheduled.

San Francisco—Demand for structurals is light, heavy private construction continues to lag. Large amount of new public works scheduled to start this spring may bring increased volume. Inventories of structurals are ample.

Seattle — Fabricators report increased interest in small lots, less than 50 tons each.

Briqueting Operations To Rise

Pittsburgh — Pittsburgh Coke & Chemical Co. will be briqueting flue dust and iron ore fines on a full commercial production basis within a month for blast furnace use. Plant capacity is rated at 450 gross tons of briquets daily.



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Pig Iron . . .

Pig Iron Prices, Page 142

New York—Because of the coal crisis, shipments of pig iron and coke are restricted. Some large producers of oven coke are making no shipments whatsoever. Consumers are more handicapped by the curtailment in coke supply than they are by the stringency in pig iron. In practically all cases, at least some iron is being moved.

Boston — No shortage of foundry iron looms in this area. Mystic furnace is offering tonnage from stock for shipment outside New England, but slack demand through the East plus a price of $50.50 furnace for No. 2 foundry limits volume. This price applies to consumers affiliated with the mutual agreement involving Mystic sales in this territory; it is assumed the quotation would hold for other buyers. Foundry melt continues on a restricted basis with little pressure for iron.

Pittsburgh — The lone merchant foundry iron stack here is operating at less than 50 per cent of capacity. U. S. Steel's subsidiaries had only 12 out of 30 blast furnaces active; all 11 units of Jones & Laughlin were banked; Crucible Steel with two units was operating only one at 30 per cent. Bethlehem Steel Co. banked three out of seven furnaces at Johnstown, Pa. Shenango Furnace is operating one out of two at Sharpsville, Pa. Pig iron stocks are ample to meet near-term needs among most jobbing foundries. However, larger foundry interests will have to curtail production soon due to the iron shortage. Restricted electric power supply is another factor reducing foundry operations.

Philadelphia—Despite the growing number of blast furnaces which have been forced down because of the fuel shortage, supply of pig iron still appears to be sufficient for current needs in this district. Due to labor troubles, various foundries in the immediate area have enough iron on hand to meet March needs. Casting demand remains spotty; such consumers of basic as are still able to maintain operations are fairly well protected. Actually, there is a greater stringency in coke than in pig iron.

Strike at a large number of A. F. of L. foundries in the immediate district continues, having just concluded its eighth week.

Cleveland—Pig iron production is further curtailed here. American Steel & Wire Co. banked its two stacks last week. Four blast furnaces in the area now are banked out of a total of nine. Those operating are on reduced blast.

Specifying against contract was more active during February than in January. This partly was attributable to foundries' efforts to augment stockpiles against possible supply shortages resulting from curtailment of blast furnace operations by the coal strike. No frantic rush to enlarge inventories has been noted, however. Most of the improved merchant iron demand over the past several weeks was due to more active foundry melt, especially shops on motor castings, heavy machinery work, radiation and sanitaryware.

Buffalo—Coke and pig iron production dropped sharply last week as a result of coal strike. Iron output, on a furnace basis, was down to 56 per cent of capacity, but production in active units was slashed also. Coke operations ranged from 15 to 50 per cent of normal. Merchant iron sellers are still taking orders.

Cincinnati—District specifications for pig iron in February were fulfilled early in the month. Melters want only normal tonnage in March. The leading district interest in oven foundry coke has halted production because of exhaustion of coal reserves.

Chicago—There had been no net change in number of blast furnaces in operation in the district up to late last week. Youngstown Sheet & Tube Co. banked its No. 2 stack at Indiana Harbor Feb. 25, leaving the company with only one out of five in operation in the district. Carnegie-Illinois Steel Corp. on Feb. 26 blew in its rebuilt and enlarged No. 4 furnace at Gary. Capacity of this furnace has been increased from 800 tons to 1500 tons a day. In all, 31 stacks are operating here, but many of these are on reduced wind.

Birmingham—Pig iron demand is much greater than the district's ability to produce. Sloss-Sheffield Steel

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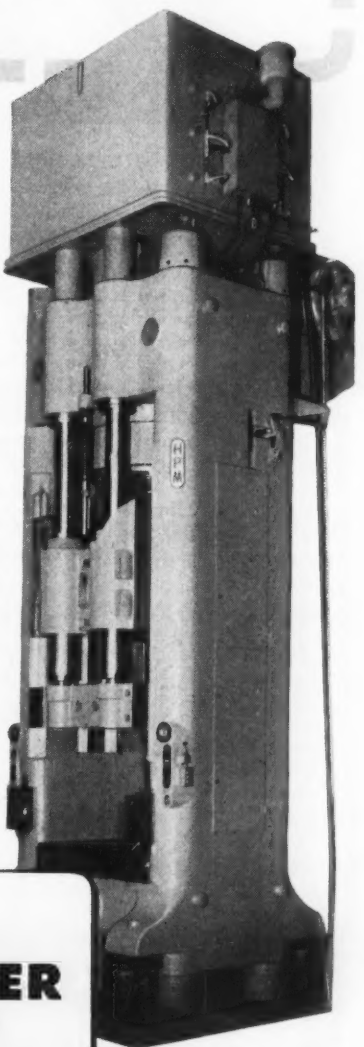

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& Iron Co. is two furnaces short; Woodward Iron Co., one; Republic Steel Corp., two. Iron-dependent industries are slowing down over the entire territory.

St. Louis—Pig iron production here dropped to 50 per cent of capacity last week. Coal and coke stocks are near the vanishing point. Koppers Co., Granite City, Ill., will bank its furnaces Mar. 6 or 7, when ground stocks also will have disappeared.

Los Angeles—The squeeze of the coal strike is being felt strongly here as Geneva Steel Co. suspends operations in all departments due to dwindling coal supplies. Kaiser Steel Corp. is still operating with one blast furnace.

San Francisco—A British cargo of 100 tons of machine-cast pig iron was landed in San Francisco late in February. It was consigned to Rolph Mills & Co.

Iron Ore . . .

Iron Ore Prices, Page 147

Cleveland — Carnegie-Illinois Steel Corp. has reduced its rated blast furnace capacity by removing from its schedule the No. 3 stack at Isabella Furnaces, Etna, Pa., and the No. 9 stack at South Works, South Chicago, Ill. The former had a rated annual capacity of 72,500 tons of ferromanganese; the latter, 245,900 tons of pig iron.

As of Feb. 1, 157 furnaces were in blast and 26 idle in the United States compared with 163 and 22, respectively, on Jan. 1 and 177 and 8, respectively, on Feb. 1, 1949.

Canadian operations held unchanged during January and February with 8 furnaces in blast and 2 idle.

Consumption of iron ore held steady in January at 6,740,047 tons compared with 6,760,481 tons in December, reports the Lake Superior Iron Ore Association. During January, 1949, consumption was some 850,000 tons larger at 7,590,471 tons.

Total stocks of iron ore on Feb. 1 amounted to 32,003,928 tons at furnaces and on Lake Erie docks compared with 38,628,510 tons a month earlier and 31,904,181 tons on Feb. 1, 1949.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 146

Pittsburgh—Output of oven and beehive foundry coke is non-existent here. However, foundry activity has not yet been curtailed due to scarcity of coke. Most interests have at least two weeks' coke supply on hand at current low level of operations. Oven foundry coke price at $20 net ton is established here as result of initial operations on commercial scale for this grade at Pittsburgh Coke & Chemical Co.'s Neville Island, Pa., plant.

Pacific Freight Rates Cut

Seattle — Additional ocean freight adjustments on steel and steel products are effective Feb. 1 through July 31. Contract rates on plain, not fabricated, iron and steel beams, channels, columns, tees and zees are reduced to $20 a long ton from $25.25; fabricated shapes to $21.25 from $26.50, WM long ton; window sash and frames are reduced from $30 to $24.75, WM. Non-contract rates are $3 higher.

These rates apply to Hongkong and Manila only in minimum lots of 250 tons, and follow a cut in mid-January on contract rates on iron angles, bars and steel sheets, nails and tin plate to $16.75, $18.75 and $19.75 per long ton respectively.

Scrap . . .

Scrap Prices, Page 150

Philadelphia — Market on major grades of open-hearth scrap is steady. Modest sized lots of No. 1 and No. 2 heavy melting steel, No. 1 bundles and No. 1 busheling have been purchased at unchanged prices. Demand for No. 2 bundles is at a virtual standstill, various consumers being dissatisfied with the quality of the material offered. Hence, the market on this grade is nominal at $18.00-$18.50.

Short shovel turnings are higher at $18, although no change is noted in machine shop turnings and mixed borings and turnings. With blast furnace production off, there is little or no demand for this latter material. Cut structurals are a shade higher at $25.50-$26. Knuckles and couplers and steel car wheels are easier at around $28.50. No. 1 cupola cast is higher at $30-$31 and charging box and heavy breakable cast at $32-$34. Strength in the latter two grades is attributed in part to growing stringency in pig iron at some of the consuming mills.

Pittsburgh—Mill purchase of No. 1 heavy melting steel and No. 1 hydraulic bundles at $31 represents decline of $1 from last sale of dealer scrap. Other open-hearth scrap grades are correspondingly lower on a nominal basis. Weaker market tone reflects drastic curtailment in mill operations. Some trade authorities contend improved pig iron supply following settlement of coal dispute should help stabilize scrap quotations. One interest has at least three blast furnaces, not previosuly operated, ready to be blown in to increase hot metal supply as required to meet anticipated capacity steel output throughout second and third quarters.

Boston — Normal price range between steelmaking grades is distorted, notably between heavy melting grades and No. 1 busheling. While lighter grades of steel scrap are somewhat firmer, holders are reluctant to sell at current prices. Demand is slow. Yard stocks of No. 2 heavy melting are heavier. Cast scrap is exceedingly slack with prices soft. Limited tonnage of No. 1 machinery move at $32 to $34 delivered.

New York—Scrap brokers have increased buying prices on charging box and heavy breakable cast to $25.50-$26, f.o.b. shipping point. All other prices are unchanged. The undertone is fairly strong. The trade is marking time pending clarification in coal.

Cleveland—Scrap shipments are moving to steelworks and foundries on schedule despite the downward

UNIVERSITY OF MICHIGAN LIBRARIES

trend in operations. Sellers here have not received any stop orders and do not anticipate any until possibly toward the end of this week. Prices are steady and the outlook is for a fairly stable market. If coal miners return to the pits shortly, consumption will increase, making for a firm, if not strong, market.

Buffalo—The scrap market generally is marking time pending a break in the coal situation. Dealers continue to ship against old orders. Yard accumulations are held down by zero weather and snow, coupled with a decrease in industrial operations. Sales of cupola cast have been made at $30.50-$31.50.

Cincinnati—Liberal use of scrap, to conserve fuel, is one factor in a stronger market for scrap. No. 1 heavy melting steel and some other grades are up $1. Some mills are specifying normally for March shipment so that nearby tonnage, coming out freely, will be absorbed. Foundry grades, excepting charging box cast, are unchanged and dull. Melters are more strict on No. bundle grading. Some, taking No. 2 bundles, yield to dealer and broker requests to absorb a proportion of No. 3.

Detroit — Flurry of excitement among brokers and dealers occasioned by the two electric furnace plants in this area entering the market for bundles died down quickly and the price level is unchanged. Tonnage of bundles on the latest automotive lists was less than 25,000 tons, and the two electric melters require close to 55,000 tons a month at their current operating rate. Ford has banked one blast furnace, resulting in a 20 per cent tapering in open-hearth output, but three electric furnaces have been returned to service. Limited buying of cast scrap for the Rouge plant buoyed these grades temporarily. Foundry demand generally is insignificant.

Chicago — Curtailed steelmaking has reduced demand and traders expect no increase in market activity until the coal crisis is over. Shipments to several mills continue restricted. One mill has announced March buying prices at unchanged levels for No. 1 and No. 2 heavy melting grades.

Birmingham — Market for better grades of open-hearth and blast furnace scrap has strengthened considerably over the last two weeks with No. 1 heavy melting quoted $1 higher at $24.

St. Louis—Scrap shipments to dealers continue to drop. Adverse weather has impeded collections. Lower prices, plus rigid grading by mills, also have discouraged shipments. Prices remain largely unchanged, with rails showing more firmness than other types.

Los Angeles — Demand for scrap lags. Dealers, having had expected that coke shortages would result in heavier scrap purchases have had their hopes dashed as Geneva Steel Co. shuts down and Kaiser Steel Corp. reduces operations.

San Francisco—Scrap market is in the doldrums. Mills are buying meagerly. Prices are unchanged.

Seattle—Volume of scrap business is below normal as mills are buying sparingly. Prices are unchanged, but buyers are in position to bear down on specifications. Supplies are ample for current needs. Inventories are static.

Warehouse . . .

Warehouse Prices, Page 147

New York—With inventories in better balance, with exception of lighter gages of galvanized and cold-rolled sheets, movement of steel from warehouses has improved slightly. Supply of cold-rolled, 18 gage and lighter, is notably short.

Boston—To meet expected increase in demand for steel from warehouses, inventories of flat-rolled material are short. On most other finished steel products, including alloys, distributors have well balanced stocks, although some orders are going to mills for fill-in sizes. Except for flat-rolled steel, pattern of buying by warehouses has returned to stock replacement. Cold-rolled and galvanized sheets in lighter gages constitute a major sales problem and distributors expect to be cut-back along with other consumers, if mill production is curtailed further.

Pittsburgh—Steel shipments from warehouse stocks remain steady. Curtailment of primary and finished steel production schedules has not resulted in a "run-on-the-bank" in

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terms of warehouse steel inventories. A good customer demand representing emergency repair requirements is noted, but only for actual needs and not to augment stocks.

Philadelphia — Distributors anticipate greater daily business this month than in February, which in turn about held its own with the preceding month. In the first place, even under normal circumstances, March is usually one of the best months of the year; secondly, the effects of the coal strike now appear likely to have a stimulating effect. Should there be continued delay on the part of miners in getting back to work, even for another week or so, there appears little doubt that distributors will be confronted with a sharp increase in demand.

Cleveland—Demand for warehouse steel is steady. Little is attributable to consumers' efforts to enlarge stocks as protection in event mill shipments are severely curtailed by the coal strike. In fact, consumers are more or less apathetic on this score, probably because large stocks would be meaningless in event manufacturing operations are forced down by lack of fuel and power.

Cincinnati—Demand for warehouse steel is brisk, chiefly in small, individual orders. Exception is in alloys which are dull. Distributors' stocks are adequate and well balanced, excepting in sheets which are not arriving fast enough to meet requirements. An expected curtailment in mill shipments, because of the fuel shortage, has not yet hit warehouses.

Los Angeles — Distributors report steady improvement in sales, particularly in bars. Fabricators, worried over impending shutdowns, are building inventories. Volume of distributor purchases is increasing, but for replacement needs only.

San Francisco—Turnover of warehouse steel remains below par despite some slight improvement. Except for sheets, distributors are well-supplied with all types of products. Competition for business is keen. Although listed prices have shown no change, most warehouses are cutting prices to attract buyers.

Seattle — An increased number of small orders are being received by distributors. The month's volume will be below normal, but heavier than January which was disappointing. Spring demand is expected shortly.

Semifinished Steel . . .

Semifinished Prices, Page 143

Pittsburgh—Higher prices are being done in sheet bars. Although the regular producer market is still quotable at $57-$58 a net ton, sales have been made up to $72.50. One nonintegrated hand mill operator is paying an average price of $70, mill. In one instance, where a $6 freight charge is involved, its semifinished material costs $4.75 per 100 lb, based on 1¼ tons of sheet bars per ton of sheets. This is in sharp contrast to $3.25 per 100 lb base for plain hot-rolled sheets quoted by integrated producers. As a result, some hand mill operators are forced to charge $6-$6.75 per 100 lb for plain sheets; $7.30, including extras for size, etc., for 18-gage hot-rolled, pickled and oiled sheets.

Structural Bookings Decline

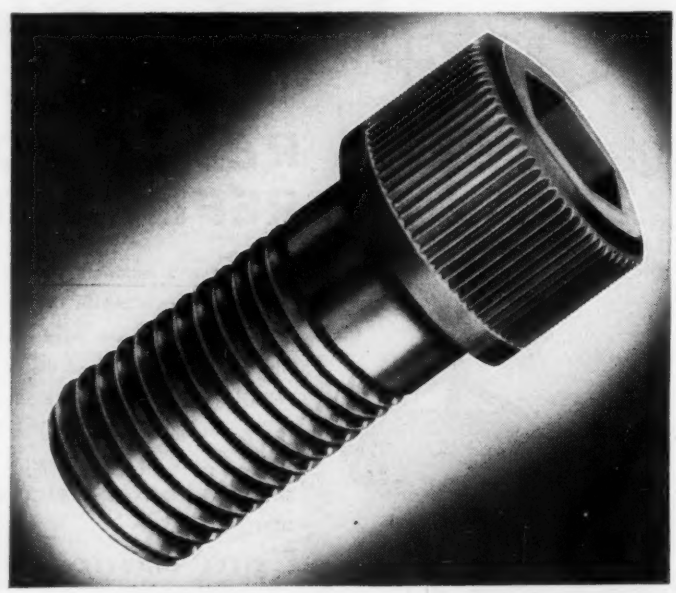
New York—Estimated structural bookings for January dropped slightly to 116,987 tons, reports American Institute of Steel Construction. This compares with 124,251 tons in December and 130,418 tons in January 1949. Shipments amounted to 131,468 tons against 135,500 tons in December and 152,746 tons in January a year ago. Backlogs, for the next four months only stood at 564,577 tons on Feb. 1.

Rails, Cars . . .

Track Material Prices, Page 145

New York—Following the sharp pick-up in car buying last month, orders have slumped sharply with no important lists having been placed in the East during the last two weeks or so.

Birmingham—Atlantic Coast Line Railroad placed an order with Tennessee Coal, Iron & Railroad Co.'s Ensley mill (now idle) for 50,000 tons of rails.



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JENKINTOWN 33, PENNSYLVANIA

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2000 tons, ramp from Lincoln tunnel to the Port Authority bus terminal, New York, to Harris Structural Steel Co., that city.

1500 tons, 12-story apartment development, Grand and Lewis streets, New York, to Grand Iron Works Inc., that city.

875 tons, warehouses, Union Bag & Paper Co., Savannah, Ga., to American Bridge Co., Pittsburgh; Morton C. Tuttle Co., Boston, general contractor.

600 tons, heating plant, Medical Center Steam Co., Chicago, to American Bridge Co., Pittsburgh; Stone & Webster Engineering Corp., Boston, general contractor.

200 tons, hangar and utility buildings, North Central State airport, Smithfield-Lincoln, R. I., to Tower Iron Works, Providence, R. I.; M. A. Gammino Construction Co., Providence, general contractor.

200 tons, warehouse, Progressive Mfg. Co., Philadelphia, to Acorn Iron Works, that city.

150 tons, Lind Coulee bridge, Columbia Basin project, to Isaacson Iron Works, Seattle; David Nygren, Seattle, general contractor.

110 tons, gymnasium, Wilkes College, Wilkes-Barre, Pa., to Ostrander Machine Works, that city.

STRUCTURAL STEEL PENDING

5150 tons, state turnpike bridge work, Allegheny county, Pennsylvania; bids Mar. 29.

4000 tons, state bridge work, Washington, Fayette and Westmoreland counties, Pennsylvania; bids Mar. 31.

3500 tons, state turnpike bridge work, Beaver county, Pennsylvania; bids Mar. 20.

1600 tons, state bridges, Reading-Wakefield, Mass.; A. V. Taurasi Co. Inc., Somerville, Mass., low on general contract.

1200 tons, state bridge work, Erie county, Pennsylvania; bids Mar. 31.

700 tons, warehouse, Barclay-White Co., Philadelphia; bids asked.

400 tons, state highway bridge, Sturbridge, Mass.; bids Mar. 7, Department of Public Works, Boston.

UNIVERSITY OF MICHIGAN LIBRARIES

1400 tons, Washington state Snake river bridge replacement; bids to Olympia, Mar. 21.

325 tons, building, Argonne National Laboratory, Chicago; Austin Co., contractor; bids asked.

250 tons, roof framing and crane runway, Canyon Ferry, Idaho, project; bids to Bureau of Reclamation, Denver, Mar. 14.

140 tons, Cedar Mountain bridge, King county, Washington; Modern Construction & Fabrication Co., Seattle, low $128,363.

125 tons, reconstruction swing span bridge, Bonneville dam; J. F. Brittan & Co., Portland, Oreg., low $53,890 to U. S. Engineer.

120 tons, state bridge, Butler county, Pennsylvania; bids Mar. 24.

New York Central, closing bids Mar. 7 on structural steel under serial contract 6-1950; on Mar. 14 on structural steel under serial contract 7-1950.

Unstated, steel frame machine shop extension, warehouse, etc., additions to Alcoa's plant, Vancouver, Wash.; general contracts to L. H. Hoffman Co. and Waale-Campion Co., Portland, Oreg.

Unstated, 125-ton traveling bridge crane, 125-ton gantry crane and 70-ton gantry crane, for Canyon Ferry project, Idaho; bids soon to Bureau of Reclamation, Denver.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1200 tons, segment, Pennsylvania Turnpike, Lancaster, Pa., reportedly to Jones & Laughlin Steel Corp., Pittsburgh.

750 tons, pulp and paper plant for Potlatch Forests Inc., Lewiston, Idaho, to Bethlehem Pacific Coast Steel Corp., Seattle.

200 tons, Washington state Metaline Falls bridge, to Northwest Steel Rolling Mills Inc., Seattle; Henry Hagman, Cashmere, Wash., general contractor.

100 tons, Lind Coulee bridge, Bureau of Reclamation project, to Northwest Steel Rolling Mills Inc., Seattle; David Nygren, Seattle, general contractor.

REINFORCING BARS PENDING

1500 tons, apartments, 4950 Marine Dr., Chicago; bids asked.

425 tons, Washington state bridge over Snake river; bids to Olympia, Mar. 21.

225 tons, bridge, Minneapolis, Great Northern Railroad; bids asked.

202 tons, county building, Berrien county, St. Joseph, Mich.; bids asked.

138 tons, state bridge work, York county, Pennsylvania; bids Mar. 10.

120 tons, state bridge, Butler county, Pennsylvania; bids Mar. 24.

100 tons (including shapes, etc.), substation at Havre, Mont., Fort Peck project; bids to Bureau of Reclamation, Denver, Mar. 21.

PIPE . . .

STEEL PIPE PENDING

Unstated, 8000 feet 10, 8 and 6 in., also aeriation trays and other equipment; bids to Harry F. Ehmer, city clerk, Grandview, Wash., Mar. 14.

RAILS, CARS . . .

RAILROAD CARS PLACED

Detroit, Toledo & Ironton, 250 fifty-ton box cars, to Pullman-Standard Car Mfg. Co., Chicago.

Gulf, Mobile & Ohio, 100 seventy-ton covered hopper cars to the Madison, Ill., plant of American Car & Foundry Co., New York.

Seaboard Air Line, 300 seventy-ton phosphate hopper cars, to Pullman-Standard Car Mfg. Co.'s Bessemer, Ala., plant; estimated cost, $2,062,000.

RAILROAD CARS PENDING

Lehigh Valley, 50-ton cars in alternate lots of 500, 1000 and 1500; bids being taken.

New York city Board of Transportation, unstated number of service cars; bids Mar. 13.

RAILS PLACED

Florida East Coast, 17,500 tons of rails; 16,500 going to the Tennessee Coal, Iron & Railroad Co., Birmingham, and 1000 tons to Bethlehem Steel Co.

Pittsburgh and West Virginia, 1012 tons of rails, to Carnegie Illinois Steel Corp.

FERROALLOYS

(*Continued from Page 147*)

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk, 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 20.50c per lb of contained chromium plus 11.30c per pound of contained silicon; 1" x down, bulk, 20.65c per pound of contained chromium plus 11.50c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c, f.o.b. Niagara Falls.

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Automatic Shears

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Hallden Automatic Flattening and Cutting Off Machines can be built into lines requiring special shearing applications.

Hallden Automatic Shears are designed to permit continuous feed of metal through the machine by synchronizing the flattener with the flying shear. Cutting accuracy can be held to plus or minus 1/64".

Hallden Shears are self-contained units which, under normal operation, require little maintenance other than lubrication.

Hallden's flexible design allows quick changing of shear knives and easy removal of flattening rolls for grinding. The shear knives always move in a mutual plane.

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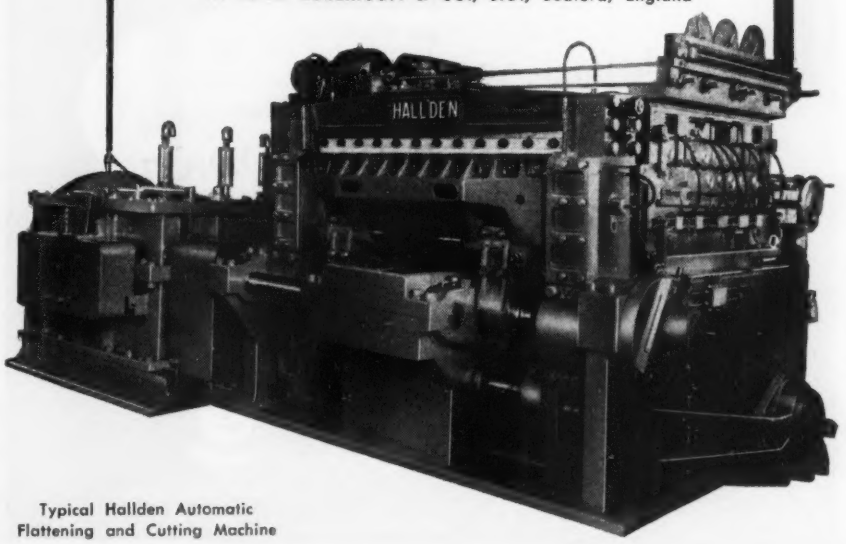


Typical Hallden Automatic Flattening and Cutting Machine

N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.00c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.65c per lb of alloy, ton lots packed 9.05c, 200 to 1999 lb 9.40c, smaller lots 9.90c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.
(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%.) Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%.) Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.) Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max. $3.10.

Grainal: Vanadium Grainal No. 1, 93c; No. 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb contained V_2O_5, freight allowed. Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W, 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconinum Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max. Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot add 5c F.o.b. Washington, Pa.., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 per lb contained B, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb. smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.50c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.00c per lb of alloy; ton lots 18.00c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

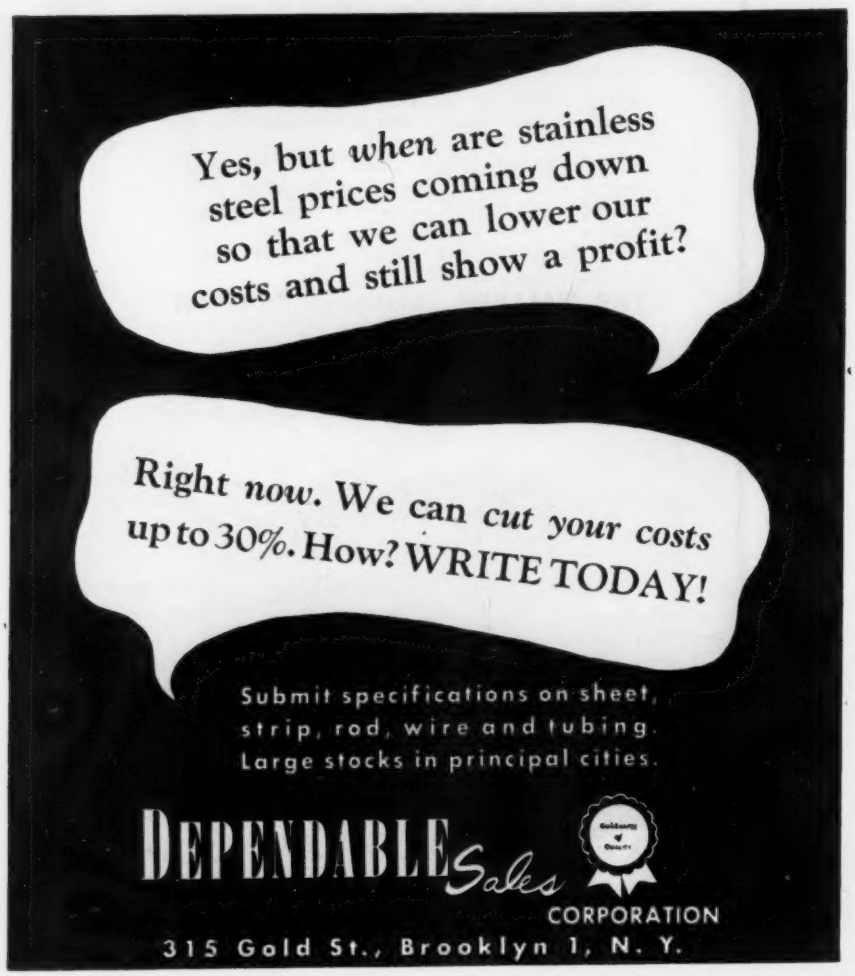
V-5 Foundry Alloy: Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Lump, bulk, carload 11.00c. Ton lots, bulk 11.50c, packed 11.75c. Less ton lots, packed 12.25c per lb of alloy, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b seller's works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb. contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo., f.o.b. Langeloth and Washington, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.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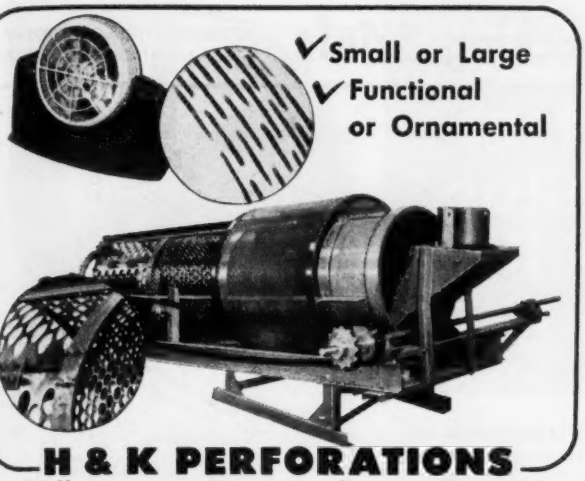

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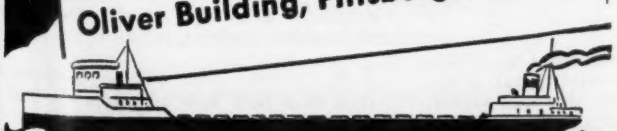

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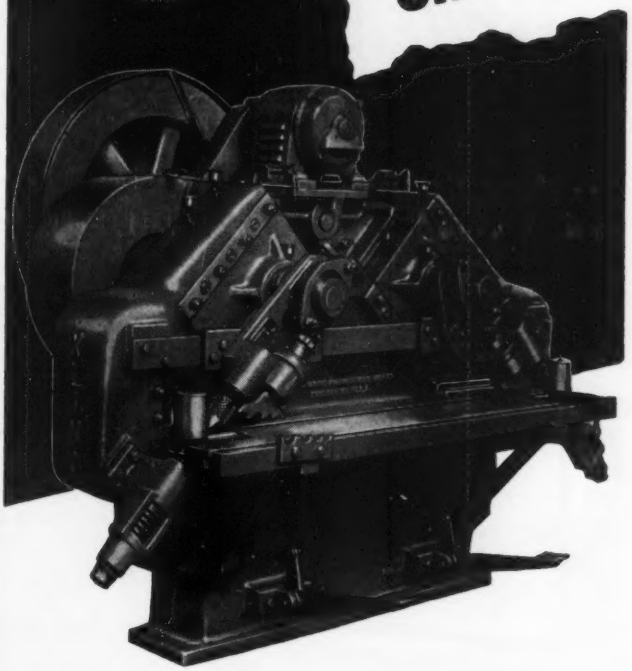

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Metalworking Briefs

CONSTRUCTION, ENTERPRISE
ORGANIZATIONAL CHANGES

El Camino College, Inglewood, Calif., began a $2 million improvement program. A machine shop, science laboratories and an administration building will be constructed.

Louis Dulien, president, **Dulien Steel Products Inc.,** purchased the Oregon Shipbuilding plant and site at Portland, Oreg., from General Services Administration. Plans are to develop the area industrially.

Bendix-Westinghouse Automotive Air Brake Co. has started construction of a $250,000 branch factory in Berkeley, Calif.

A main building of **International Nutrition Laboratories Inc.'s** soybean food processing plant near Mt. Vernon, O., was damaged by fire Feb. 13. Value of the building and contents was $160,000.

Landis Tool Co., Waynesboro, Pa., purchased **Gardner Machine Co.,** Beloit, Wis. Officers of the new organization: M. A. Hollengreen, president; Walter B. Leishman, vice president and general manager; C. Winslow Thompson, vice president and assistant general manager; Ingle R. Shue, secretary; Mark F. Frantz, treasurer.

Automatic Firing Corp. has moved its general offices to its new plant at 4417 Oleatha Ave., St. Louis. Factory equipment will be moved into the plant within the next few weeks.

Tyler Seaboard Sales Corp.—machinery—was chartered in Delaware. United States Corp., Dover, Del., is serving as the principal office.

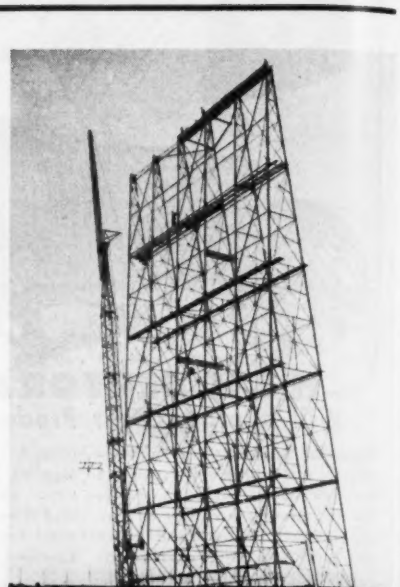
Irving Engineering & Mfg. Co., 3195 W. Belmont Ave., Fresno, Calif., entered the consulting, mechanical design and development business. The company also will manufacture such things as special springs, small stampings and machine work.

National-Standard Co., Niles, Mich., acquired the **Reynolds Wire Co.,** manufacturer of fine wire cloth and meshes with plants at Dixon, Ill. National-Standard will operate the Reynolds firm as a wholly owned subsidiary.

American Air Filter Co. Inc., Louisville, and **Herman Nelson Corp.,** Moline, Ill., have merged and will operate under the name of the former company. Each organization will continue to operate from its respective headquarters in the field of heating, ventilating, air filtering and dust control equipment.

Dacar Chemical Products Co., Pittsburgh, acquired an additional plant at East Liverpool, O., for the manufacture of its chemical products sold to steel plants, foundries and other industries.

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has appointed: **Miller-Joyce,** 122½ S. Vermont Ave., Los Angeles, to handle Birdsboro hydraulic presses and related equipment in southern California and Arizona; **Whitty Engineering Co.,** 10 High St., Boston, the same products in New England; **J. R. Allen Co.,** 402 Swetland Bldg., Cleveland, to handle rough and machined castings in Ohio with the exception of counties in eastern Ohio bordering Pennsylvania and West Virginia.



170-FOOT BOOM: Erection of Bethlehem Pacific's new 160-foot high steel frames for testing transmission towers at its South San Francisco plant is nearing completion. The crew is using a 170-foot boom to maneuver a top member into place. Two steel frames (one is not shown) are the only steel testing frames for transmission towers west of the Mississippi

Sterling Bolt Co. moved its warehouse, factory and office to its new plant at 4646 W. Lake St., Chicago 44.

Central Scientific Co., Chicago, was appointed distributor of **General Electric Co.'s** silicone products, members of a new chemical family for use in laboratories.

Cutler-Hammer Inc.—electrical manufacturers — Milwaukee, opened a sales office at 410 W. First St., Dayton, O. P. L. Erickson manages the office as a branch of the company's Cincinnati district office.

J. F. Crowley Ltd. will begin production of a new line of warm air heating equipment at a plant under construction at Dunda, Ont. Steel work at the plant was completed.

Tom J. Rutledge and Roy E. Charbonneau were appointed sales representatives in the area comprising the

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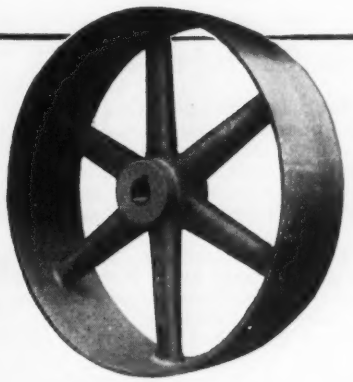
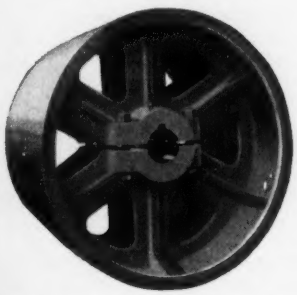
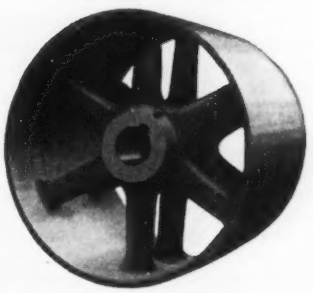


Single arm solid pulley



Extra heavy conveyor pulley



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lower part of Michigan and Lucas county, Ohio, for forging machines by **Hill Acme Co.**, Cleveland.

Rossborough Supply Co., manufacturer of mixing chemicals for foundries, was incorporated by Paul A., Walter N. and Kenneth J. Rossborough. The company is located at 1456 W. Ninth St., Cleveland.

A new steel blanking, warehousing and fabricating firm, **Momart Steel Corp.**, was chartered through Edward Ginsburg, attorney, Hippodrome building, Cleveland. Operations of the company are expected to be started around Mar. 1. Incorporators are M. A. Zitello, R. Brdar, and J. Keating.

Ashley Metal Plating Co., 2125 Kirk Ave., Baltimore, will start operations soon in a newly equipped one-story building. It will do a general line of metal plating work.

Bendix Radio Division, Bendix Aviation Corp., has acquired 19,200 sq ft of space for warehousing in the Canton Warehouses, Ponta street and Leland avenue, Baltimore.

General Oil Burner Corp., 2300 Sinclair Lane, Baltimore, changed its corporate name to **General Automatic Products Corp.** The company makes home heating equipment.

Standard Mfg. Co., engaged in welding and metal fabrication, moved to 1426 E. Lombard St., Baltimore.

Daffin Mfg. Co., Lancaster, Pa., was established by Irl A. Daffin, farm and industrial equipment manufacturer. In the Daffin line is farm, feed manufacturing and industrial equipment. Machinery includes the Daffin Feed-U-Nit, hammer mill equipment, Mill-U-Nit, disk harrows and industrial-type humidifiers with the Hum-O-Zone trade-name.

Dominion Foundries & Steel Ltd., Hamilton, Ont., will produce cast steel four-wheel motor truck frames for diesel locomotives. The plant launched a retooling program to handle the new work estimated to cost $350,000.

M & F Pipe Shop, San Francisco, acquired Coast Pipe & Supply Co.'s fabricating plant. M & F makes pipe for industrial plumbing, steam and fire control systems.

Washington Water Power Co., Spokane, provided for a $5 million improvement and expansion program in its 1950 budget.

Durallium Products Corp. and Durallium Laboratories Inc. now are occupying the entire premises of the Durallium building in Chicago.

Cooper Alloy Foundry Co., Hillside, N. J., is scheduling its second stainless steel valve clinic for Apr. 26. It will be in the form of a dinner-meeting at Statler Hotel, Buffalo. Invitations are limited to those in the Buffalo area who are directly concerned with the purchasing, specifying or maintenance of stainless steel, nickel or monel valves.

Construction started on a $5 million ammonia plant at Freeport, Tex., for **Dow Chemical Co.** The plant is scheduled to be in production by late 1950.

Hagerty Bros. Co., Peoria, Ill., has completed an addition to its steel warehouse. The building is equipped now to handle a considerably larger volume of steel, particularly structural items. The company serves a territory about 100 miles in each direction from Peoria, stocking and distributing industrial supplies as well as warehousing steel.

Phillips Oil Co. has agreed with the Venezuelan government to construct a modern refinery and wax plant in eastern Venezuela.

Brooks & Perkins Inc.—magnesium metal fabricators—moved into a newly constructed office building at 1950 W. Fort St., Detroit 16. Telephone number: Tashmoo 5-5900.

Whiting Corp.—foundry equipment, cranes and railroad maintenance equipment—is moving its Philadelphia district sales office to 9 Rittenhouse Place, Ardmore, Pa. Telephone: Ardmore 8100. G. M. Dennis will continue as district manager.

"Water Course," consisting of lecture and discussion meetings covering the fundamentals of water chemistry, industrial water problems, plant problems, and interpretation of water tests, will be presented at Hotel Sheraton, Newark, N. J., Apr. 6, 13, 20 and 27; and at the Engineers Club, Baltimore, Mar. 28, Apr. 4, 18 and 25. The course is conducted by Dr. R. C. Ulmer, technical director, Power Chemicals Division, **E. F. Drew & Co. Inc.**, New York.

State Tool & Die Co., 4511 Lorain Ave., Cleveland, was incorporated by Emil H., Joseph E., Michael W. and John B. Orenick.

Richard Haber, 1090 Union Commerce Bldg., Cleveland, incorporated the **Ohio Machine & Welding Co.** to manufacture and deal in all types of metals.

Ohio Power Co., 305 Cleveland Ave., Canton, O., plans to spend $18.7 million in 1950 to expand or improve its electric generation, transmission and distribution facilities. This is part of a five-year program to be completed in 1951 at a cost of $86 million.

American Brake Shoe Co., New York, consolidated all operations of its Canadian subsidiaries, Joliette Steel Ltd. and Ramapo of Canada Ltd., into one corporation, **Dominion Brake Shoe Co. Inc.**, 1405 Peel St., Montreal. Operating divisions are: Brake Shoe, Joliette Steel, Canadian Ramapo, American Brakeblok, and Kellogg.

Enos & Sanderson Co.—steel distributor—has purchased a tract of land in Tonawanda, N. Y., for expansion purposes. A warehouse, office and storage facilities will be constructed.

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